SK-FM3-176PMC-ETHERNET

Hardware V2.0 / Documentation V1.0



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2. The software deliverables are provided on an as-is basis without charge and are subject to alterations. It is the user's obligation to fully test the software in its environment and to ensure proper functionality, qualification and compliance with component specifications.

3. Regarding hardware deliverables, the following limited warranty shall apply:

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6. The contents of this document are subject to change by SPANSION without a prior notice, thus contact SPANSION about the latest one.

This board and its deliverables must only be used for test applications in an evaluation laboratory environment.

Overview

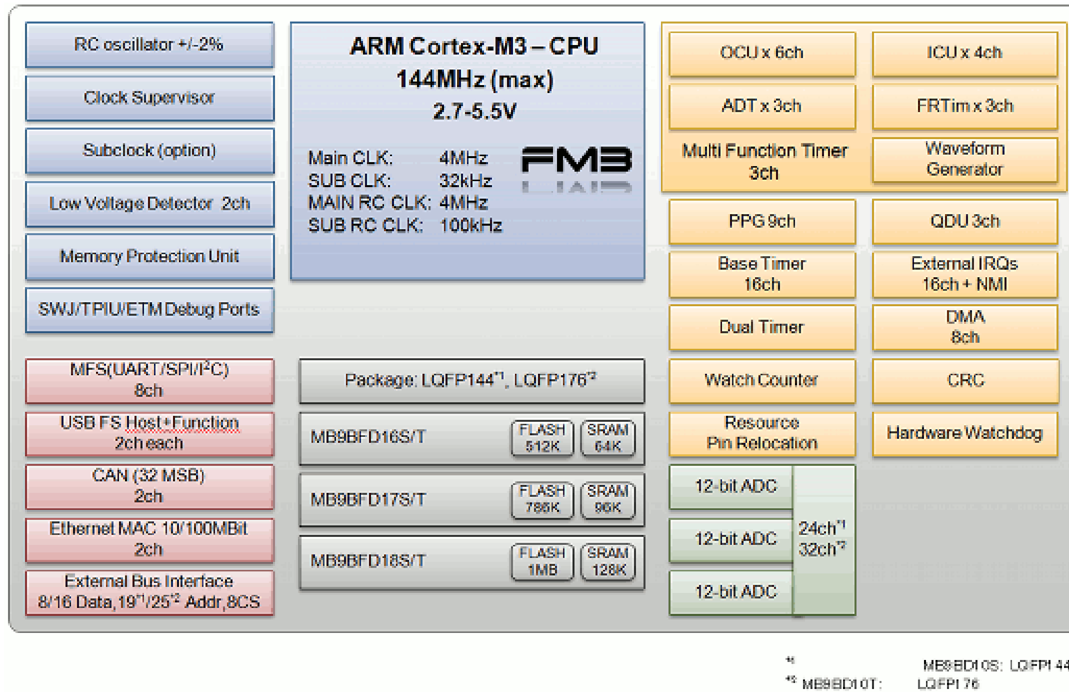
- MCU Features, Board Features & Contents
- Test it
- The Hardware / Pin Overview
- The Jumper Table / Jumper Default
- Board Power
- Software Examples & Tools
- Flash Programming
- JTAG / CMSIS-DAP
- IAR-Embedded Workbench
- KEIL µVision
- Workshops, Contacts & More



- **Additional documents**
  - Schematic (HW version 2.0) (1.1)
  - Data sheet MB9BD10T Series
    - Peripheral Manual (errata)
      - Timer part (errata)
      - Analog part (errata)
      - Communication part (errata)
      - Ethernet part
    - Flash programming manual (errata)

Features of the microcontroller

- SK-FM3-176PMC-ETHERNET is a versatile evaluation board based on the Spansion ARM® Cortex-M3™ device MB9BFD18T
- The MB9BD10T Series includes the following features:
  - 32-bit ARM Cortex-M3 Core with up to 144MHz operation
  - Up to 1 Mbyte high-speed flash memory with true 72MHz and Flash Accelerator System
  - Up to 128Kbyte on-chip SRAM memory
  - Wide supply voltage range from 2.7 to 5.5 V
  - 2 Ethernet - MAC channels
  - 2 USB interface channels
  - 8 Multi-function Serial Interface channels (for UART, CSIO (SPI), I2C and LIN)
  - 8 DMA Controller channels
  - 3 12-bit A/D Converters, 1MSp, 32 channels max.
  - External bus interface
  - 16 Base Timer channels (PWM, PPG, reload or PWV timers selectable)
  - Up to 154 fast General Purpose I/O Ports
  - 3 Multi-function Timer units(can be used to achieve the motor control)
  - 3 Quadrature Position/Revolution Counter (QPRC) channels
  - Dual Timer (32/16bit Down Counter)
  - Resource Pin Relocation
  - Hardware Watchdog
  - CRC (Cyclic Redundancy Check) Accelerator
  - Five dynamically selectable clock sources (2 external oscillator, 2 internal CR oscillator, Main PLL)
  - Clock Supervisor (CSV)
  - Low Voltage Detector (LVD) and Low Power Mode

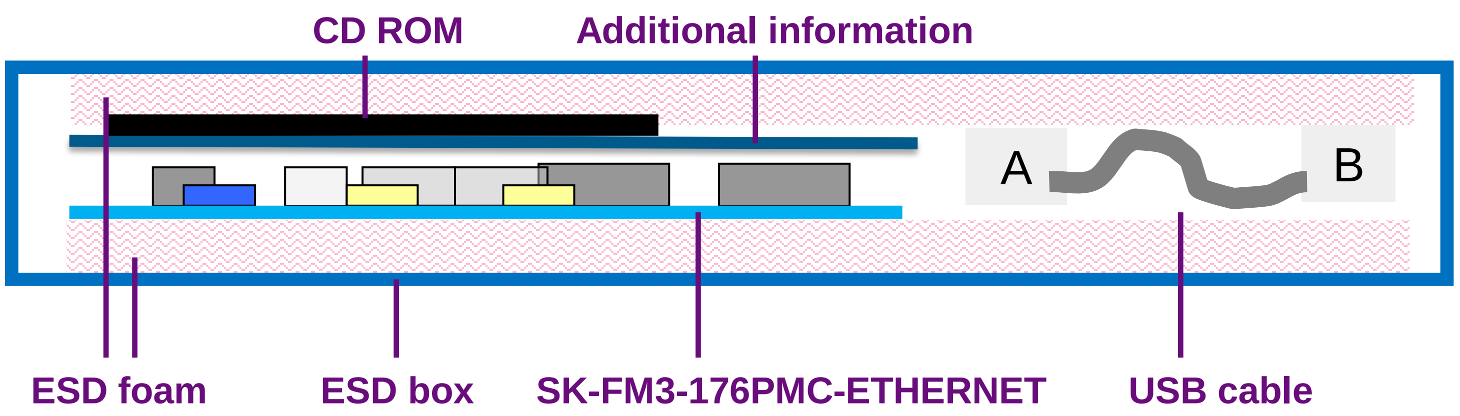


Features of the board

- Features of the SK-FM3-176PMC-ETHERNET board:
  - Microcontroller MB9BFD18T
  - 2x Ethernet connectors
  - 2x USB-Host (Type-A connector)
  - 1x USB-Device (Type-B connector)
  - 1x USB-to-serial converter (Type-B connector)
    - UART and on-board JTAG simultaneously (version 1.1: OpenOCD, version 2.0: CMSIS DAP)
  - 1x High-speed CAN-Transceiver
  - 1x UART-Transceiver (SUB-D9 connector)
  - JTAG and Trace Interface each on a 20 pin-header
  - 2x LED-Display (7-Segment)
  - 2x pushbutton (*User* buttons), rotary encoder, potentiometer
  - 1x *Reset*-button, *Reset*-LED
  - All 176 pins routed to pin-header
  - On-board 5V and 3V voltage regulators to supply MCU, *Power*-LED
  - 4x Power supply options: USB, USB-Device, JTAG or external 8V to 12V
  - Voltage filter for ADC
  - 3x Motor-Control-Interface for e.g. SK-POWER-3P-LV2-MC
  - Multicon-Interface to connect e.g. the Fujitsu SK-TSC-1127S-SB

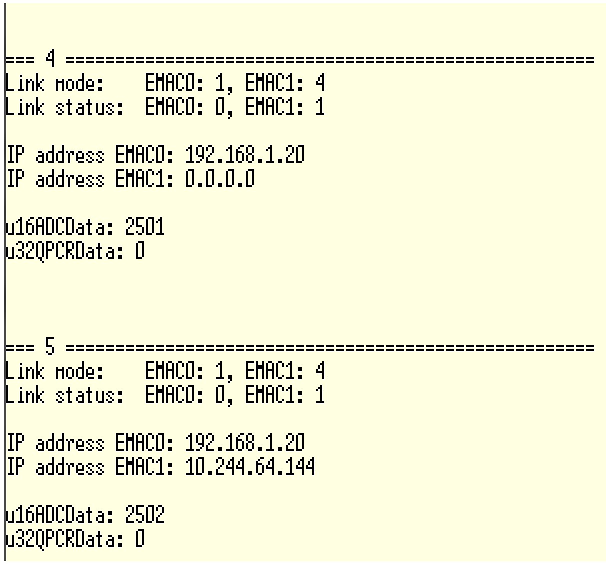
Contents SK-FM3-176PMC-ETHERNET

- The SK-FM3-176PMC-ETHERNET box contains
  - The SK-FM3-176PMC-ETHERNET evaluation board
  - USB cable
  - CD: Documentation, software examples and development utilities
  - 1-page flyer



Test it

- The microcontroller on the SK-FM3-176PMC-ETHERNET
  is already preprogrammed with an example application (<drive:>\Examples\mb9bf61xt_ethernet_lwip_v13.zip).
  - Connect the SK-FM3-176PMC-ETHERNET via USB (X11) with the PC
    - Verify that jumper J5 is in the *USBPWR1* position
    - Switch SW1 is set to *RUN*
    - Press the *Reset*-button
    - The SK-FM3-176PMC-ETHERNET‘s display will show „00“
    - Using pushbuttons SW3 and SW2 increase or decrease value
- Install the USB Driver first <drive:>\drivers\driverinstaller.exe
  - Check the availibility for virtual COM port
  - e.g. Windows Device Manager
  - Open a serial terminal tool
  - e.g. Spansion Serial Port Viewer
    <drive:>\tools\serialportviewer\setup.exe
  - Settings 115200 baud, 8N1
  - Board system status is printed to the console.



```
=== 4 ==================================================
Link mode:    EMAC0: 1, EMAC1: 4
Link status:  EMAC0: 0, EMAC1: 1

IP address EMAC0: 192.168.1.20
IP address EMAC1: 0.0.0.0

u16ADCData: 2501
u32QPCRData: 0


=== 5 ==================================================
Link mode:    EMAC0: 1, EMAC1: 4
Link status:  EMAC0: 0, EMAC1: 1

IP address EMAC0: 192.168.1.20
IP address EMAC1: 10.244.64.144

u16ADCData: 2502
u32QPCRData: 0
```

- Connect X15 (static IP address 192.168.1.20) or X16 (DHCP) to a local network
  - DHCP address can be found out via serial debug console (see above)
  - Point your webbrowser to board‘s IP address

Test it

- You finished successfully the first test

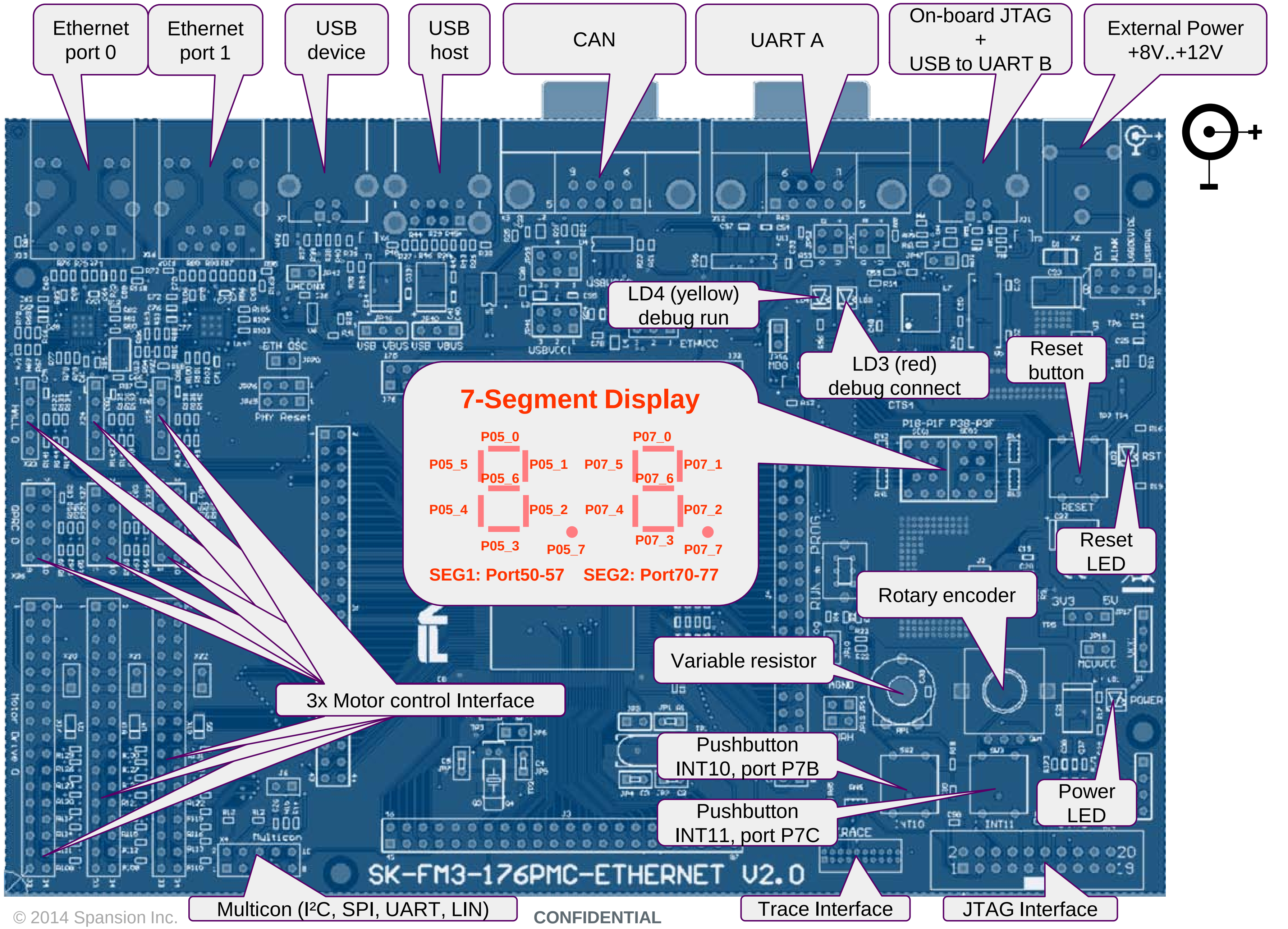
Congratulations!

- Now you will get more details about the SK-FM3-176PMC-ETHERNET

- You will learn more about
  - The on-board features
  - How to program the Flash
  - How to start with IAR-Embedded-Workbench and KEIL µVision

Hardware

The Hardware (Top Side) – Function Overview



Pin-List SK-FM3-176PMC-ETHERNET (1/8)

Pin	Function	Description
1	VCC	MCUVCC
2	PA0/RTO20_0/TIOA08_0/FRCK1_0	Reset Multicon Connector / INT0
3	PA1/RTO21_0/TIOA09_0/IC10_0	Hall Sensor1-3 /INT1
4	PA2/RTO22_0/TIOA10_0/IC11_0	Hall Sensor1-4
5	PA3/RTO23_0/TIOA11_0/IC12_0	Hall Sensor1-5
6	PA4/RTO24_0/TIOA12_0/IC13_0/RX0_2/INT03_0	TINT Multicon Connector
7	PA5/RTO25_0/TIOA13_0/TX0_2/INT10_2	GINT Multicon Connector
8	P05/TRACED0/TIOA05_2/SIN4_2/INT00_1	UART4 (RXD)/ TRACED0
9	P06/TRACED1/TIOB05_2/SOT4_2/INT01_1	UART4 (TXD)/ TRACED1
10	P07/TRACED2/ADTG_0/SCK4_2	TRACED2
11	P08/TRACED3/TIOA00_2/CTS4_2	CTS4/TRACED3
12	P09/TRACECLK/TIOB00_2/RTS4_2/DTTI2X_0	RTS/TRACECLK
13	P50/INT00_0/AIN0_2/SIN3_1/RTO10_0/IC20_0/MOEX_0	MotorDrive1 PWM1H / SEG1-A
14	P51/INT01_0/BIN0_2/SOT3_1/RTO11_0/IC21_0/MWEX_0	MotorDrive1 PWM1L /SEG1-B
15	P52/INT02_0/ZIN0_2/SCK3_1/RTO12_0/IC22_0/MDQM0_0	MotorDrive1 PWM2H /SEG1-C
16	P53/SIN6_0/TIOA01_2/INT07_2/RTO13_0/IC23_0/MDQM1_0	MotorDrive1 PWM2L / SEG1-D
17	P54/SOT6_0/TIOB01_2/RTO14_0/MALE_0	MotorDrive1 PWM3H /SEG1-E
18	P55/SCK6_0/ADTG_1/RTO15_0/MRDY_0	MotorDrive1 PWM3L /SEG1-F
19	P56/SIN1_0/INT08_2/TIOA09_2/DTTI1X_0/MNALE_0	MotorDrive1 FAULT /SEG1-G
20	P57/SOT1_0/TIOB09_2/INT16_1/MNCLE_0	SEG1-DP
21	P58/SCK1_0/TIOA11_2/INT17_1/MNWEX_0	
22	P59/SIN7_0/RX1_1/TIOB11_2/INT09_2/MNREX_0	

Pin-List SK-FM3-176PMC-ETHERNET (2/8)

Pin	Function	Description
23	P5A/SOT7_0/TX1_1/TIOA13_1/INT18_1/MCSX0_0	
24	P5B/SCK7_0/TIOB13_1/INT19_1/MCSX1_0	
25	P5C/TIOA06_2/INT28_0/IC20_1	
26	P5D/TIOB06_2/INT29_0/DTTI2X_1	MotorDrive2 FAULT
27	VSS	GND
28	P30/AIN0_0/TIOB00_1/INT03_2	QPRC0-A
29	P31/BIN0_0/TIOB01_1/SCK6_1/INT04_2	QPRC0-B
30	P32/ZIN0_0/TIOB02_1/SOT6_1/INT05_2	QPRC0-Z
31	P33/INT04_0/TIOB03_1/SIN6_1/ADTG_6	
32	P34/FRCK0_0/TIOB04_1/TX0_1	CANL
33	P35/IC03_0/TIOB05_1/RX0_1/INT08_1	CANH
34	P36/IC02_0/SIN5_2/INT09_1/TIOA12_2/MCSX2_0	Hall Sensor0-5
35	P37/IC01_0/SOT5_2/INT10_1/TIOB12_2/MCSX3_0	Hall Sensor0-4
36	P38/IC00_0/SCK5_2/INT11_1/MCLKOUT_0	Hall Sensor0-3
37	P39/DTTI0X_0/ADTG_2	MotorDrive0 FAULT
38	P3A/RTO00_0/TIOA00_1	MotorDrive0 PWM1H
39	P3B/RTO01_0/TIOA01_1	MotorDrive0 PWM1L
40	P3C/RTO02_0/TIOA02_1	MotorDrive0 PWM2H
41	P3D/RTO03_0/TIOA03_1	MotorDrive0 PWM2L
42	P3E/RTO04_0/TIOA04_1	MotorDrive0 PWM3H
43	P3F/RTO05_0/TIOA05_1	MotorDrive0 PWM3L
44	VSS	GND

Pin-List SK-FM3-176PMC-ETHERNET (3/8)

Pin	Function	Description
45	VCC	MCUVCC
46	P40/TIOA00_0/RTO10_1/INT12_1	
47	P41/TIOA01_0/RTO11_1/INT13_1	
48	P42/TIOA02_0/RTO12_1	
49	P43/TIOA03_0/RTO13_1/ADTG_7	
50	P44/TIOA04_0/RTO14_1	U14 LAN reset ‘nRST’
51	P45/TIOA05_0/RTO15_1	U12 LAN reset ‘nRST’
52	C	C-pin
53	VSS	GND
54	VCC	MCUVCC
55	P46/X0A	Subclock (optional)
56	P47/X1A	Subclock (optional)
57	INITX	Key button ‘Reset’
58	P48/DTTI1X_1/INT14_1/SIN3_2	
59	P49/TIOB00_0/IC10_1/AIN0_1/SOT3_2	
60	P4A/TIOB01_0/IC11_1/BIN0_1/SCK3_2/MADATA00_0	
61	P4B/TIOB02_0/IC12_1/ZIN0_1/MADATA01_0	
62	P4C/TIOB03_0/IC13_1/SCK7_1/AIN1_2/MADATA02_0	
63	P4D/TIOB04_0/FRCK1_1/SOT7_1/BIN1_2/MADATA03_0	
64	P4E/TIOB05_0/INT06_2/SIN7_1/ZIN1_2/MADATA04_0	
65	P70/TX0_0/TIOA04_2/MADATA05_0	SEG2-A
66	P71/RX0_0/INT13_2/TIOB04_2/MADATA06_0	SEG2-B

Pin-List SK-FM3-176PMC-ETHERNET (4/8)

Pin	Function	Description
67	P72/SIN2_0/INT14_2/AIN2_0/MADATA07_0	SEG2-C / QPRC2-A
68	P73/SOT2_0/INT15_2/BIN2_0/MADATA08_0	SEG2-D/ QPRC2-B
69	P74/SCK2_0/ZIN2_0/MADATA09_0	SEG2-E/ QPRC2-Z
70	P75/SIN3_0/ADTG_8/INT07_1/MADATA10_0	SEG2-F
71	P76/SOT3_0/TIOA07_2/INT11_2/MADATA11_0	SEG2-G
72	P77/SCK3_0/TIOB07_2/INT12_2/MADATA12_0	SEG2-DP
73	P78/AIN1_0/TIOA15_0/MADATA13_0	SW Rotary-A /QPRC1-A
74	P79/BIN1_0/TIOB15_0/INT23_1/MADATA14_0	SW Rotary-B /QPRC1-B
75	P7A/ZIN1_0/INT24_1/MADATA15_0	QPRC1-Z
76	P7B/TIOB07_0/INT10_0	
77	P7C/TIOA07_0/INT11_0	
78	P7D/TIOA14_1/FRCK2_1/INT12_0	USB Host-Overcurrent
79	P7E/TIOB14_1/IC21_1/INT24_0	Hall Sensor2-3
80	P7F/TIOA15_1/IC22_1/INT25_0	Hall Sensor2-4
81	PF0/TIOB15_1/SIN1_2/INT13_0/IC23_1	Hall Sensor2-5 / SIN Multicon Connector
82	PF1/TIOA08_1/SOT1_2/INT14_0	SDA1 Multicon Connector
83	PF2/TIOB08_1/SCK1_2/INT15_0	SCL1 Multicon Connector
84	PE0/MD1	
85	MD0	Programming Switch S1
86	PE2/X0	4MHz Crystal
87	PE3/X1	4MHz Crystal
88	VSS	GND

Pin-List SK-FM3-176PMC-ETHERNET (5/8)

Pin	Function	Description
89	VCC	MCUVCC
90	P10/AN00/MCSX7_0	Motor Drive0-U_DC_BUS
91	P11/AN01/SIN1_1/INT02_1/RX1_2/FRCK0_2/MCSX6_0	Motor Drive0-U_PH_A
92	P12/AN02/SOT1_1/TX1_2/IC00_2/MCSX5_0	Motor Drive0-U_PH_B
93	P13/AN03/SCK1_1/IC01_2/MCSX4_0	Motor Drive0-U_PH_C
94	P14/AN04/SIN0_1/INT03_1/IC02_2/MAD00_0	Motor Drive0-I_DC_BUS
95	P15/AN05/SOT0_1/IC03_2/MAD01_0	Motor Drive0-I_PH_A
96	P16/AN06/SCK0_1/INT20_1/MAD02_0	Motor Drive0-I_PH_B
97	P17/AN07/SIN2_2/INT04_1/MAD03_0	Motor Drive0-I_PH_C
98	P18/AN08/SOT2_2/INT21_1/MAD04_0	Motor Drive1-U_DC_BUS
99	P19/AN09/SCK2_2/INT22_1/MAD05_0	Motor Drive1-U_PH_A
100	P1A/AN10/SIN4_1/INT05_1/TIOA13_2/IC00_1/MAD06_0	Motor Drive1-U_PH_B
101	P1B/AN11/SOT4_1/INT25_1/TIOB13_2/IC01_1/MAD07_0	Motor Drive1-U_PH_C
102	P1C/AN12/SCK4_1/INT26_1/TIOA14_2/IC02_1/MAD08_0	Motor Drive1-I_DC_BUS
103	P1D/AN13/CTS4_1/INT27_1/TIOB14_2/IC03_1/MAD09_0	Motor Drive0-I_PH_A
104	P1E/AN14/RTS4_1/INT28_1/TIOA15_2/DTTI0X_1/MAD10_0	Motor Drive0-I_PH_B
105	P1F/AN15/ADTG_5/INT29_1/TIOB15_2/FRCK0_1/MAD11_0	Motor Drive0-I_PH_C
106	AVCC	AVCC
107	AVRH	AVRH
108	AVSS	GND
109	VSS	GND
110	PB0/AN16/TIOA09_1/SIN7_2/INT16_0	Motor Drive2-U_DC_BUS

Pin-List SK-FM3-176PMC-ETHERNET (6/8)

Pin	Function	Description
111	PB1/AN17/TIOB09_1/SOT7_2/INT17_0	Motor Drive2-U_PH_A
112	PB2/AN18/TIOA10_1/SCK7_2/INT18_0	Motor Drive2-U_PH_B
113	PB3/AN19/TIOB10_1/INT19_0	Motor Drive2-U_PH_C
114	PB4/AN20/TIOA11_1/SIN0_2/INT20_0	Motor Drive2-I_DC_BUS
115	PB5/AN21/TIOB11_1/SOT0_2/INT21_0/AIN2_2	Motor Drive2-I_PH_A
116	PB6/AN22/TIOA12_1/SCK0_2/INT22_0/BIN2_2	Motor Drive2-I_PH_B
117	PB7/AN23/TIOB12_1/INT23_0/ZIN2_2	Motor Drive2-I_PH_C
118	P29/AN24/MAD12_0	
119	P28/AN25/ADTG_4/INT09_0/RTO05_1/MAD13_0	
120	P27/AN26/INT02_2/RTO04_1/MAD14_0	
121	P26/AN27/SCK2_1/RTO03_1/MAD15_0	
122	P25/AN28/SOT2_1/TX1_0/RTO02_1/MAD16_0	
123	P24/AN29/SIN2_1/INT01_2/RX1_0/RTO01_1/MAD17_0	
124	P23/AN30/SCK0_0/TIOA07_1/RTO00_1	Variable resistor
125	P22/AN31/SOT0_0/TIOB07_1/ZIN1_1	UART0 (TXD)
126	P21/SIN0_0/INT06_1/BIN1_1	UART0 (RXD)
127	P20/INT05_0/CROUT_0/UHCONX1/AIN1_1/MAD18_0	
128	PF6/FRCK2_0/NMIX	
129	USBVCC1	USB- Power supply
130	P82/UMP1	USB Data -
131	P82/UDP1	USB Data +
132	VSS	GND

Pin-List SK-FM3-176PMC-ETHERNET (7/8)

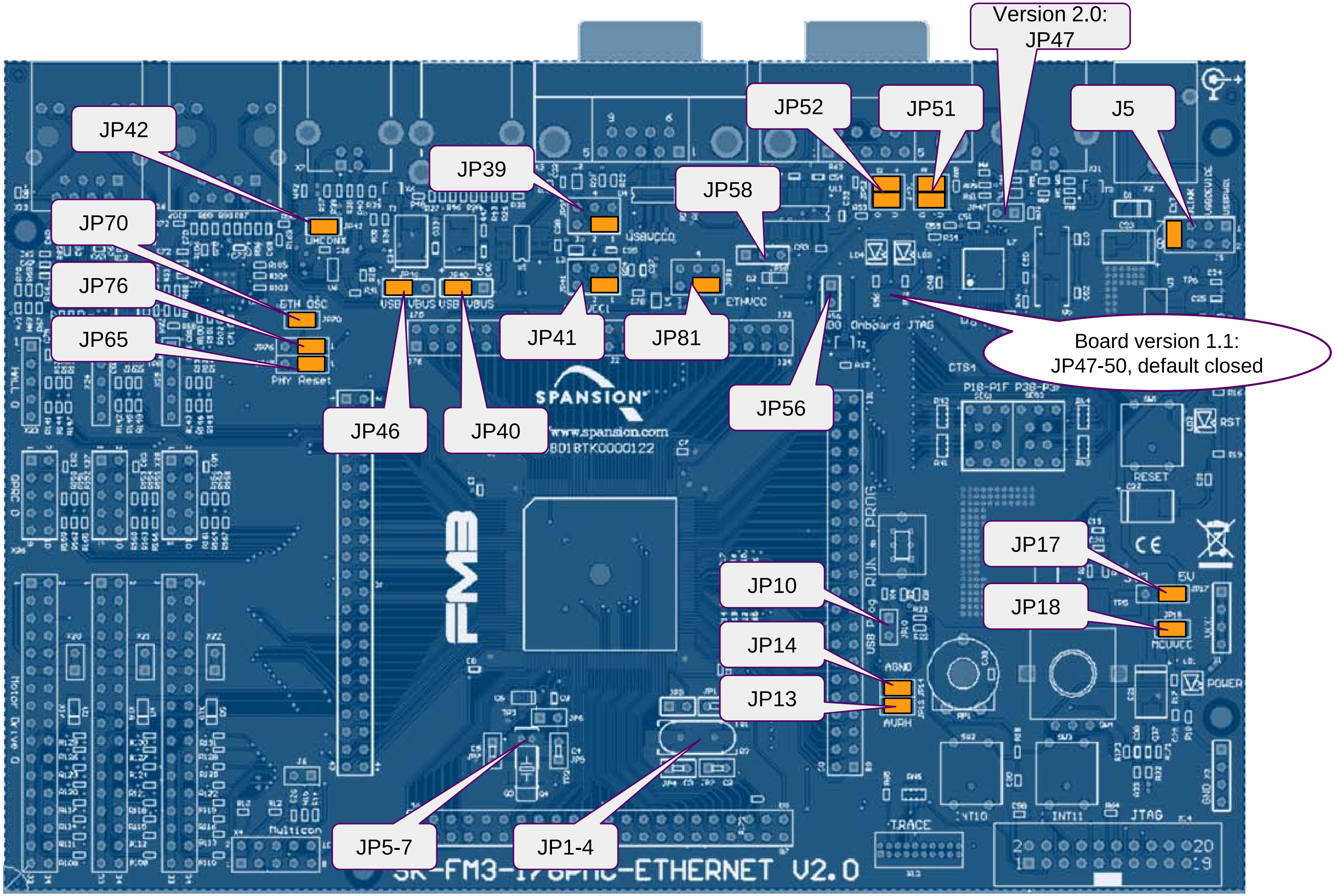
Pin	Function	Description
133	VCC	MCUVCC
134	P00/**TRSTX**	JTAG TRSTX
135	P01/**TCK**	JTAG TCK / TRACE TCK
136	P02/**TDI**	JTAG TDI/ TRACE TDI
137	P03/**TMS**	JTAG TMC/ TRACE TMC
138	P04/**TDO**	JTAG TMC/ TRACE TMC
139	P90/TIOB08_0/RTO20_1/INT30_0/MAD19_0	Motor Drive2-PWM1H
140	P91/TIOB09_0/RTO21_1/INT31_0/MAD20_0	Motor Drive2-PWM1L
141	P92/TIOB10_0/RTO22_1/SIN5_1/MAD21_0	Motor Drive2-PWM2H
142	P93/TIOB11_0/RTO23_1/SOT5_1/MAD22_0	Motor Drive2-PWM2L
143	P94/TIOB12_0/RTO24_1/SCK5_1/INT26_0/MAD23_0	Motor Drive2-PWM3H
144	P95/TIOB13_0/RTO25_1/INT27_0/MAD24_0	
145	PC0/**E_RXER0_RXDV1**	Ethernet
146	PC1/**E_RX03_RX11**	Ethernet
147	PC2/**E_RX02_RX10**	Ethernet
148	PC3/**E_RX01**/TIOA06_1	Ethernet
149	PC4/**E_RX00**/TIOA08_2	Ethernet
150	PC5/**E_RXDV0**/TIOA10_2	Ethernet
151	PC6/**E_MDIO0**/TIOA14_0	Ethernet
152	PC7/**E_MDC0**/CROUT_1	Ethernet
153	PC8/**E_RXCK0_REFCK**	Ethernet clock
154	**PC9**/E_COL0	Host/Device USB switch

Pin-List SK-FM3-176PMC-ETHERNET (8/8)

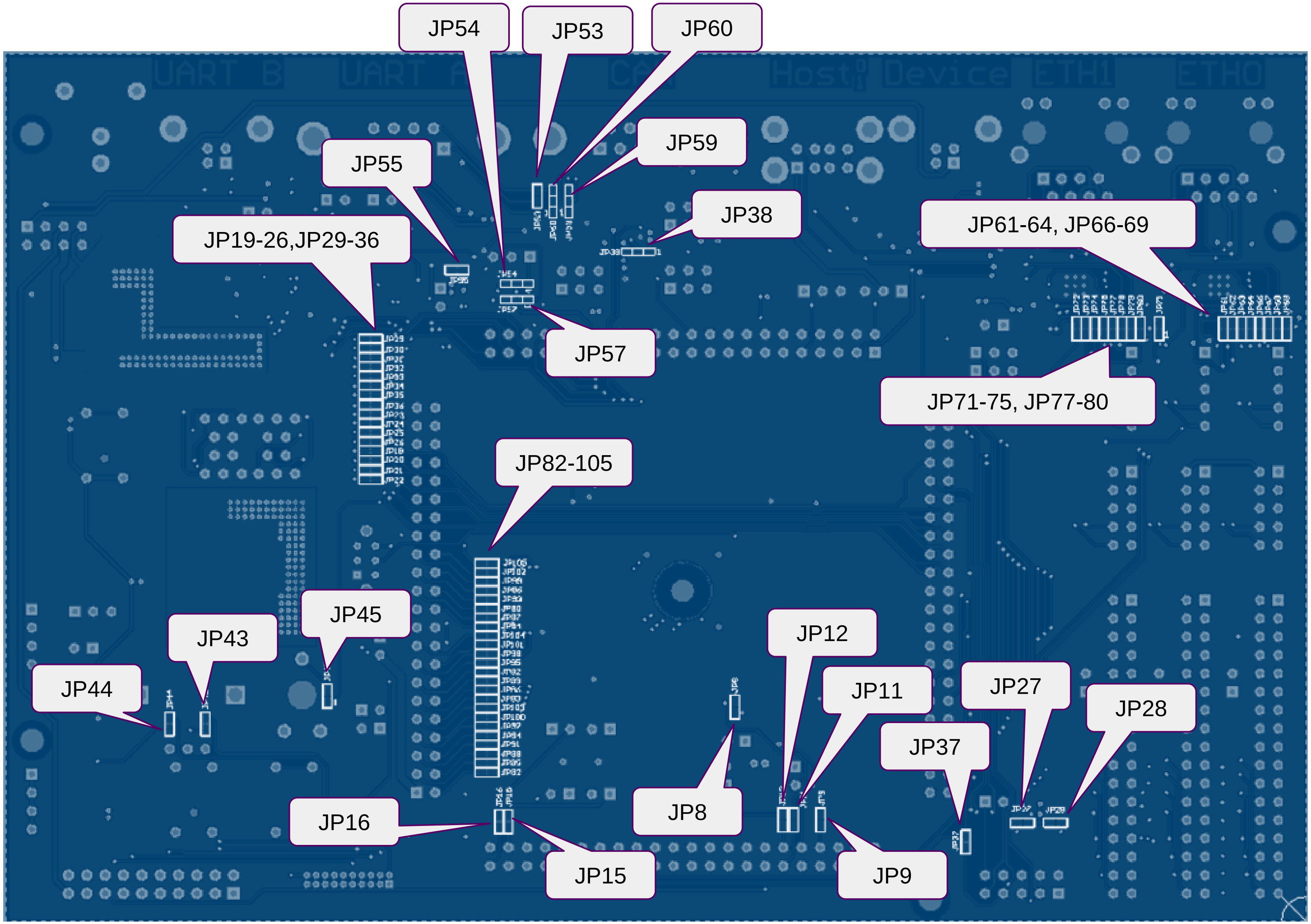
Pin	Function	Description
155	**PCA**/E_CRS0	USB Host enable
156	ETHVCC	Ethernet VCC
157	VSS	GND
158	**PCB**/E_COUT	
159	**PCC**/E_MDIO1	Reset Ethernet switch
160	PCD/**E_TCK0_MDC1**	Ethernet
161	PCE/**E_TXER0_TXEN1**/RTS4_0/TIOB06_1	Ethernet
162	PCF/**E_TX03_TX11**/CTS4_0/TIOB08_2	Ethernet
163	PD0/**E_TX02_TX10**/SCK4_0/TIOB10_2/INT30_1	Ethernet
164	PD1/**E_TX01**/SOT4_0/TIOB14_0/INT31_1	Ethernet
165	PD2/**E_TX00**/SIN4_0/TIOA03_2/INT00_2	Ethernet
166	PD3/**E_TXEN0**/TIOB03_2	Ethernet
167	P62/E_PPS0_PPS1/SCK5_0/ADTG_3	
168	P61/SOT5_0/TIOB02_2/UHCONX0	USB UHCONX
169	P60/SIN5_0/TIOA02_2/INT15_1	Programming Switch S1
170	PF3/TIOA06_0/SIN6_2/INT06_0/AIN2_1	
171	PF4/TIOB06_0/SOT6_2/INT07_0/BIN2_1	
172	PF5/SCK6_2/INT08_0/ZIN2_1	
173	USBVCC0	USBVCC
174	P80/UDM0	USB Switch
175	P81/UDP0	USB Switch
176	VSS	GND

The Hardware (v2.0 Top Side) – Jumper Settings

: default position



The Hardware (v2.0 Bottom Side) – Jumper Settings



Jumper Settings SK-FM3-176PMC-ETHERNET

Number	Description	Special Type	Default
JP1	Main Clock Oscillator		open
JP2	Main Clock Oscillator		open
JP3	Main Clock Oscillator		open
JP4	Main Clock Oscillator		open
JP5	Sub Clock Oscillator		open
JP6	Sub Clock Oscillator		open
JP7	Sub Clock Oscillator		open
JP8	C-Pin	Solder Jumper	closed
JP9	C-Pin	Solder Jumper	closed
JP10	USB/UART programming		open
JP11	Sub Clock Oscillator	Solder Jumper	closed
JP12	Sub Clock Oscillator	Solder Jumper	closed
JP13	AVRH		closed
JP14	AGND		closed
JP15	Main Clock Oscillator	Solder Jumper	closed
JP16	Main Clock Oscillator	Solder Jumper	closed
JP17	5V/3V3		1-2
JP18	MCUVCC		closed

Number	Description	Special Type	Default
JP19	SEG1 - P50	Solder Jumper	closed
JP20	SEG1 - P51	Solder Jumper	closed
JP21	SEG1 - P52	Solder Jumper	closed
JP22	SEG1 - P53	Solder Jumper	closed
JP23	SEG1 - P54	Solder Jumper	closed
JP24	SEG1 - P55	Solder Jumper	closed
JP25	SEG1 - P56	Solder Jumper	closed
JP26	SEG1 - P57	Solder Jumper	closed
JP27	Multicon / I2C / SCL-Pullup		closed
JP28	Multicon / I2C / SDA-Pullup		closed
JP29	SEG2 - P70	Solder Jumper	closed
JP30	SEG2 - P71	Solder Jumper	closed
JP31	SEG2 - P72	Solder Jumper	closed
JP32	SEG2 - P73	Solder Jumper	closed
JP33	SEG2 - P74	Solder Jumper	closed
JP34	SEG2 - P75	Solder Jumper	closed
JP35	SEG2 - P76	Solder Jumper	closed
JP36	SEG2 - P77	Solder Jumper	closed

Jumper

Jumper Settings SK-FM3-176PMC-ETHERNET

Number	Description Version 1.1	Version 2.0	Special Type	Default
JP37	SPI / SIN-Pin		Solder Jumper	open
JP38	CAN MCUVCC / VCC5V		Solder Jumper	2-3
JP39	USBVCC0			1-2
JP40	VBUS USBH0			2-3
JP41	USBVCC1			1-2
JP42	USB UHCONX			closed
JP43	Rotary Encoder		Solder Jumper	closed
JP44	Rotary Encoder		Solder Jumper	closed
JP45	Potentiometer		Solder Jumper	closed
JP46	VBUS USBH1			1-2
JP47	FTDI JTAG	CMSIS DAP prog		closed/ v2.0:open
JP48	FTDI JTAG	Not available		closed
JP49	FTDI JTAG	Not available		closed
JP50	FTDI JTAG	Not available		closed
JP51	UART / SOT USB <-> RS232			U-0
JP52	UART / SIN USB <-> RS232			R-1
JP53	Flow control			open
JP54	CTS4			open

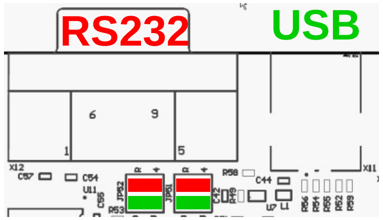
Number	Description	Special Type	Default
JP47	FTDI JTAG		closed
JP48	FTDI JTAG		closed
JP49	FTDI JTAG		closed
JP50	FTDI JTAG		closed
JP51	UART / SOT USB <-> RS232		U-0
JP52	UART / SIN USB <-> RS232		R-1
JP53	Flow control		open
JP54	CTS4		open
JP55	MAX3232 VCC	Solder Jumper	closed
JP56	UART MD0	Solder Jumper	open
JP57	RTS		open
JP58	UART-RST		open
JP59	Flow control	Solder Jumper	1-2
JP60	Flow control	Solder Jumper	2-2
JP61	Ethernet PHY0	Solder Jumper	closed
JP62	Ethernet PHY0	Solder Jumper	closed
JP63	Ethernet PHY0	Solder Jumper	closed
JP64	Ethernet PHY0	Solder Jumper	closed

Jumper Settings SK-FM3-176PMC-ETHERNET

Number	Description	Special Type	Default
JP65	Ethernet PHY0 Reset		1-2
JP66	Ethernet PHY0	Solder Jumper	closed
JP67	Ethernet PHY0	Solder Jumper	closed
JP68	Ethernet PHY0	Solder Jumper	closed
JP69	Ethernet PHY0	Solder Jumper	closed
JP70	Ethernet Clock Enabled		closed
JP71	Ethernet Reference Clock	Solder Jumper	closed
JP72	Ethernet PHY1	Solder Jumper	closed
JP73	Ethernet PHY1	Solder Jumper	closed
JP74	Ethernet PHY1	Solder Jumper	closed
JP75	Ethernet PHY1	Solder Jumper	closed
JP76	Ethernet PHY1 Reset		1-2
JP77	Ethernet PHY1	Solder Jumper	closed
JP78	Ethernet PHY1	Solder Jumper	closed
JP79	Ethernet PHY1	Solder Jumper	closed
JP80	Ethernet PHY1	Solder Jumper	closed
JP81	Ethernet VCC		1-2
JP82	Motor Control 0	Solder Jumper	closed

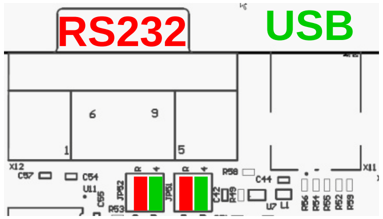
Number	Description	Special Type	Default
JP83	Motor Control 1	Solder Jumper	open
JP84	Motor Control 2	Solder Jumper	open
JP85	Motor Control 0	Solder Jumper	closed
JP86	Motor Control 1	Solder Jumper	open
JP87	Motor Control 2	Solder Jumper	open
JP88	Motor Control 0	Solder Jumper	closed
JP89	Motor Control 1	Solder Jumper	open
JP90	Motor Control 2	Solder Jumper	open
JP91	Motor Control 0	Solder Jumper	closed
JP92	Motor Control 1	Solder Jumper	open
JP93	Motor Control 2	Solder Jumper	open
JP94	Motor Control 0	Solder Jumper	closed
JP95	Motor Control 1	Solder Jumper	open
JP96	Motor Control 2	Solder Jumper	open
JP97	Motor Control 0	Solder Jumper	closed
JP98	Motor Control 1	Solder Jumper	open
JP99	Motor Control 2	Solder Jumper	open
JP100	Motor Control 0	Solder Jumper	closed

- JP51, JP52 : UART selection
  - UART0 and UART4 of the microcontroller can be used together with a standard RS232 SUB-D9 connector and a serial/USB converter
  - The jumpers JP51 and JP52 routes the channel to the connector
  - The interface is selected by the jumpers‘ alignment
  - UART0 = USB-connector (X11), UART4 = Sub-D9 (X12) (default)
    - Setting of Jumper JP51 and JP52: U-0 / R-4

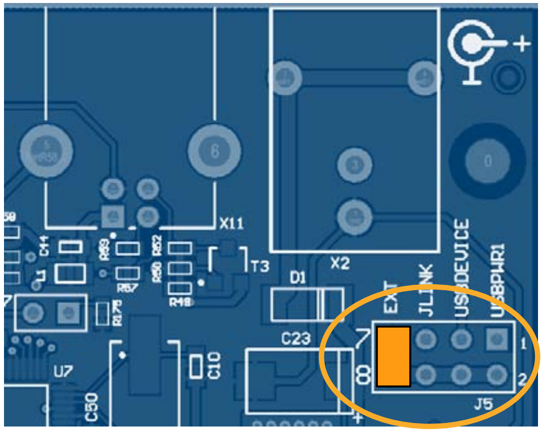


(default)

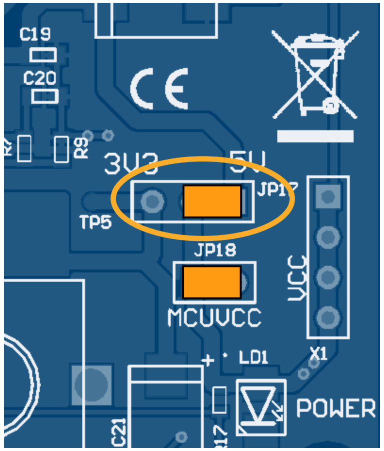
  - UART0 = Sub-D9 (X12), UART4 = USB-connector (X11)
    - Setting of Jumper JP51 and JP52: U-4 / R-0



- The starter kit can be powered by
  - external power supply (8-12V) (default)
  - JLINK/JTAG connector X14 (CN3
  - USB device connector X7
  - by UART B USB connector X11



- The Microcontroller can be supplied with 3.3V or 5V
  - Jumper JP17 selects MCUVCC
  - Default: JP17: 1-2 (3.3V)



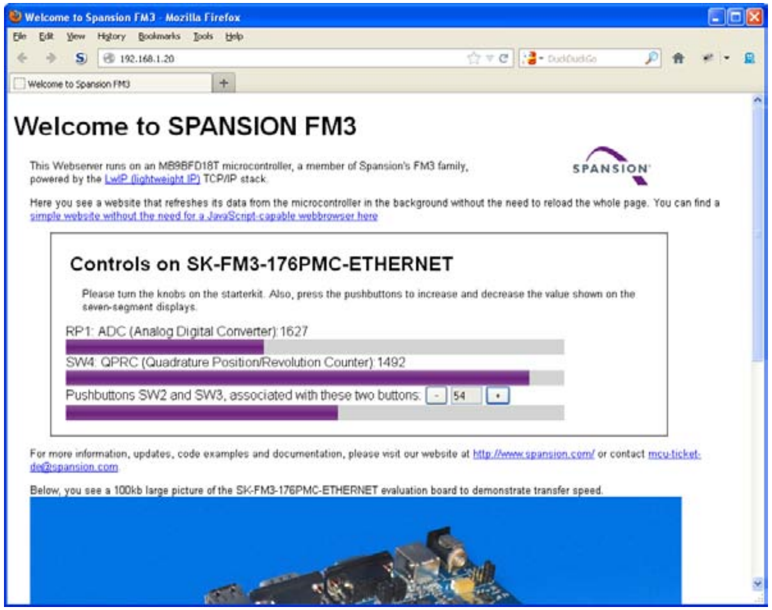
Software

Software Examples

- Software examples for IAR EWARM V6.60 or KEIL µVision5.1:

  See <drive:>\Examples\ or www.spansion.com

  - mb9bfd18t_template-v16
    - ‚Empty' project as base for user applications
  - mb9bfxxx_ethernet-driver-v13.zip
    - Fujitsu low-level Ethernet driver
  - mb9bfxxx_ethernet_uip-v19.zip
    - Port of the free µIP (micro-IP) TCP/IP stack including webserver
  - mb9bfxxx_ethernet-lwip-v14.zip
    - Port of the free LwIP (Lightweight IP) TCP/IP stack including AJAX-enabled web application



Note: Please copy the examples to your local drive before compiling!

You can find a demonstration firmware and additional product information

of the commercially supported TCP/IP stack by SEVENSTAX on this CD.

Software Tools

- The following software tools are available
  - USB Virtual-COM port
    - allows UART communciation via the PC‘s USB connection
    - On-board UART-to-USB converter (via X11, CMSIS-DAP)
    - For driver installation <drive:>\drivers\driverinstaller.exe
  - FLASH USB DIRECT Programmer
    - Microcontroller Flash programming (via X7, USB-Device-Port)
    - Install from <drive:>\tools\USBDIRECT
  - Terminal program ‚Serial Port Viewer‘
    - Install from <drive:>\tools\serialportviewer\setup.exe

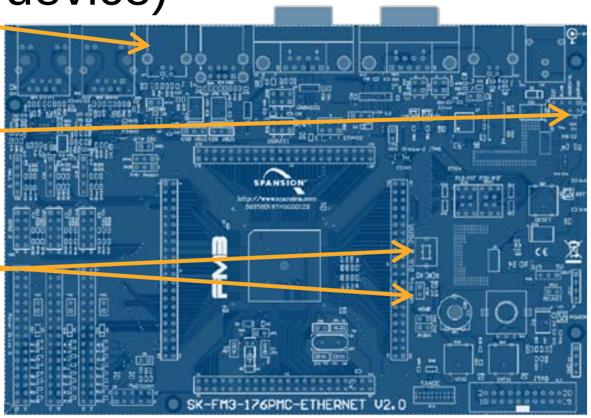
Flash Programming

Flash Programming

- There are several options to program the microcontroller’s flash:
  - FLASH USB DIRECT Programmer via X7 (USB device)
    - For installation <drive:>\tools\USBDIRECT\setup.exe
    - USB driver is located in subdirectory of FLASH USB DIRECT Programmer
  - FLASH MCU Programmer via X11 (Serial via UART A or UART B)
    - For installation <drive:>\tools\PCWFM3-V01L07\setup.exe
    - For driver installation of USB/Virtual-COM port v2.0: <drive:>\drivers\driverinstaller.exe
    - v1.1: Spansion OpenOCD Starter -> button „Install driver“
  - JTAG Programming via X11 (v2.0: CMSIS-DAP, v1.1: OpenOCD)
    - Example is given for IAR and KEIL
    - See documentation of your development suite how to setup CMSIS-DAP
  - JTAG Programming via X14 (optional JTAG adapter)
    - The correct JTAG-adapter must be selected in the IDE toolchain

Flash Programming via X7 (USB direct)

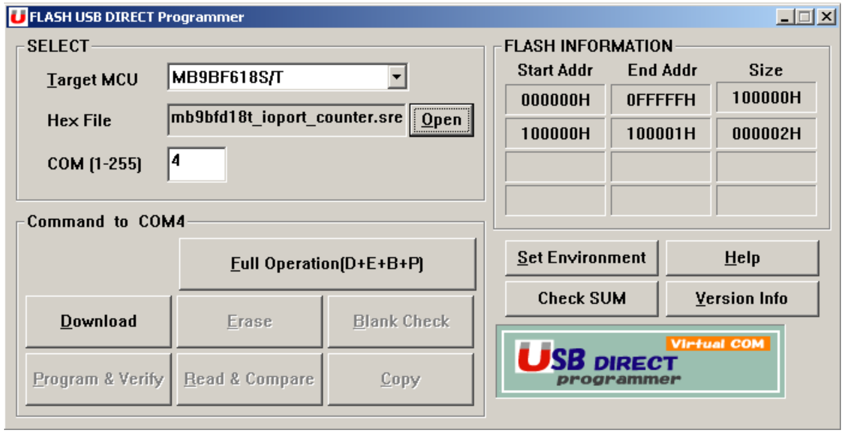
- FLASH USB DIRECT Programming via X7 (USB device)
  - Jumper Setting
    - Select the MCU power supply (J5)
    - Close JP10
    - Set switch S1 to position PROG
  - Connect USB port X7 with the PC
  - If connected for first time Windows OS may ask for a driver
    - See subfolder ‚driver‘ of USBdirect installation path or <drive:>\tools\USBDIRECT\driver
  - Start the FLASH USB DIRECT Programmer
    - For first installation: <drive:>\tools\USBDIRECT\setup.exe
    - Select the COM port
    - Press Reset
    - Start Full Operation
    - Set switch S1 to position RUN
    - Press Reset



Flash Programming via X7 (USB device)

- Choose the right target MCU MB9BFD18S/T
- Browse for the programming file (*.srec or *.hex)
  - IAR: see subfolder <project>\example\IAR\output\release\exe
  - ARM/KEIL: see subfolder <project>\example\ARM\output\release
- Adjust the corresponding virtual COM-port

Select MCU: MB9BFD18S/T
Select file (*.srec; *.hex)
Select Virtual COM-port



- Use ‚Full Operation‘
  - Download kernel
  - Erase Flash memory / Blank check
  - Program & Verify project to Flash memory
- Set switch S1 to position RUN and press Reset button

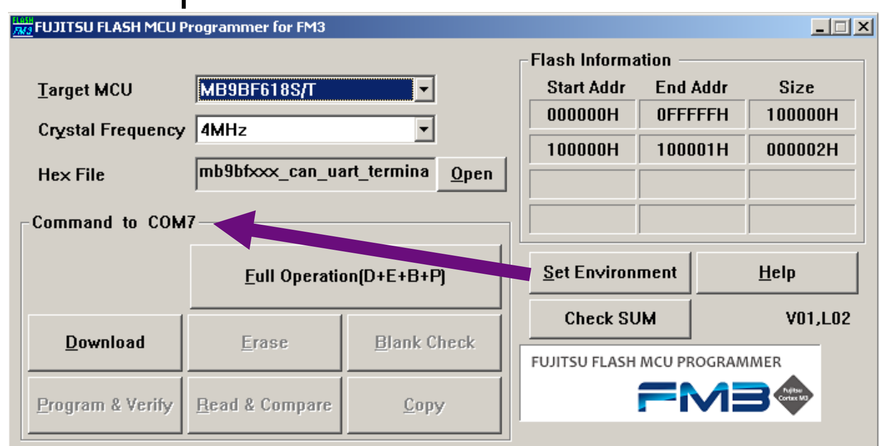
Flash Programming via X11 or X12 (Serial)

- FLASH MCU Programming via X11 or X12 (UART A or UART B)
- Jumper setting
  - Check jumper setting: J14:2-3 (P60)
  - Connect the board via USB CMSIS-DAP (CN3) to the USB-Port of the PC
    - When connected for first time Windows OS may ask for ‚spansionusbvcomm.inf‘
      - <drive:>\drivers\cmsis-dap
  - Use the FLASH MCU Programmer for FM3/FM4
    - For installation <drive:>\tools\PCWFM3-V01L07\setup.exe

Flash Programming via X11 or X12 (Serial)

- Choose the right target MCU MB9BFD18S/T
- Select JP51 and JP52 accordingly
- Select 4MHz Crystal Frequency
- Browse for the programming file (*.srec or *.hex)
  - IAR: see subfolder <project>\example\IAR\output\release\exe
  - ARM/KEIL: see subfolder <project>\example\ARM\output\release
- Adjust the corresponding virtual COM-port

Select MCU: MB9BFD18S/T
Select 4MHz Crystal Frequency
Select file (*.srec / *.hex)
Select Virtual COM-port
Execute ‚Full Operation‘
incl. stand-alone operations
- Download Kernel
- Erase
- Blank Check
- Program&Verify



- Set switch S1 to position RUN and press Reset button

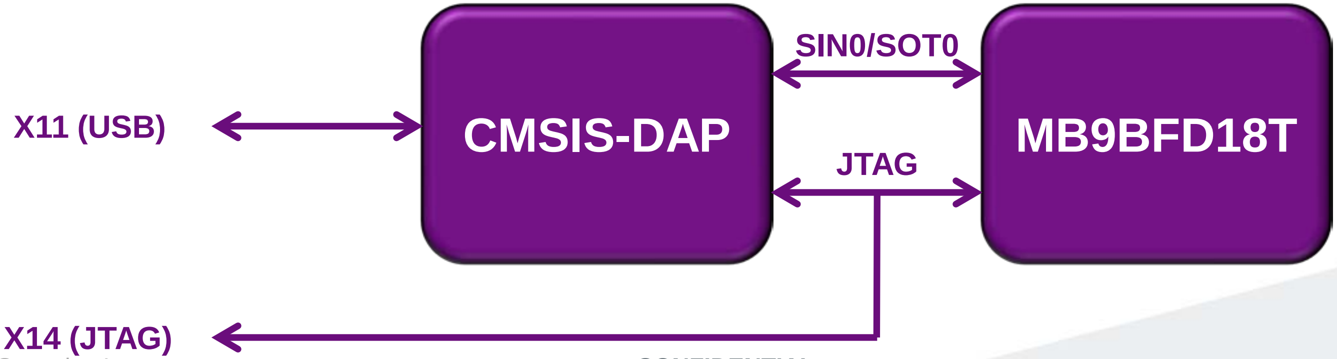
JTAG Debugger

JTAG adapter

- SK-FM3-176PMC-FA contains an on-board JTAG debugger that can be connected via X11 (UART B) USB connector.
- Board version v2.0 uses CMSIS-DAP
- Board version v1.1 uses OpenOCD

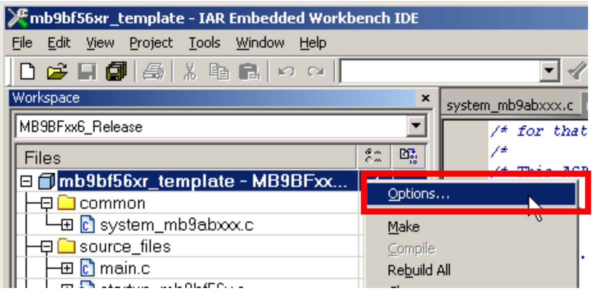
JTAG adapter CMSIS-DAP

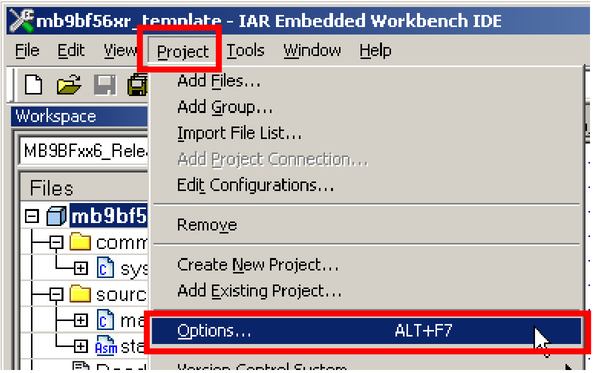
- This starterkit includes an on-board JTAG adapter
  - Compatible to CMSIS-DAP
    http://www.keil.com/support/man/docs/dapdebug/dapdebug_introduction.htm
  - Select debugger CMSIS-DAP in your tool chain
- Any other JTAG-adapter can be connected to X14, too.
  - The correct JTAG-adapter must be selected in the IDE toolchain
    - No jumper setting is required
- Additional virtual COM port is provided by X11 (UART B)
    - For driver installation <drive:>\drivers\driverinstaller.exe
    - Please set jumper J19 and J20 accordingly



Setup in IAR EWARM (1)

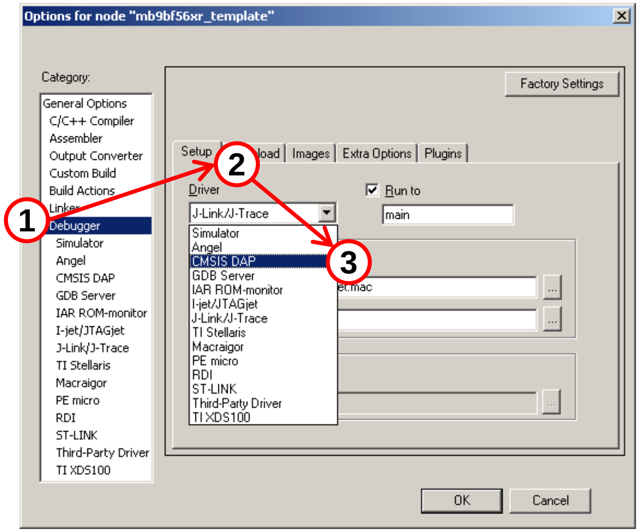
- Navigate to project options:
  - Via Files-List
    - Right-click at the project
    - Select „Options...“
  - Or via menu „Project“
    - Select „Options...“



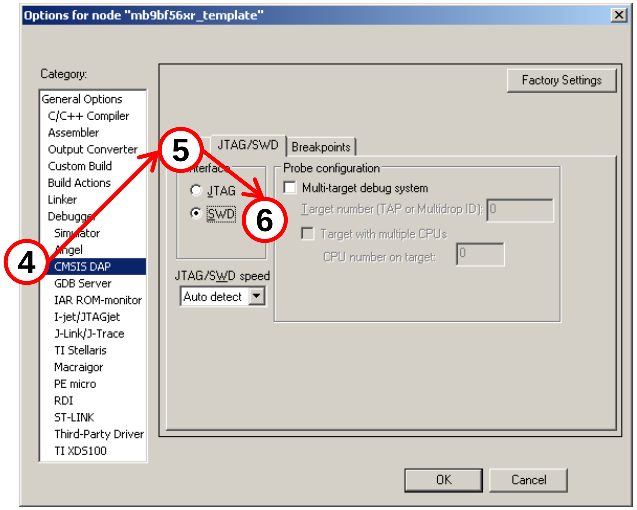


Setup in IAR EWARM (2)

- Setup Project Debbuger Options
  - (1) Navigate to Debugger
  - (2) Select tab „Setup“
  - (3) Select Driver „CMSIS-DAP“



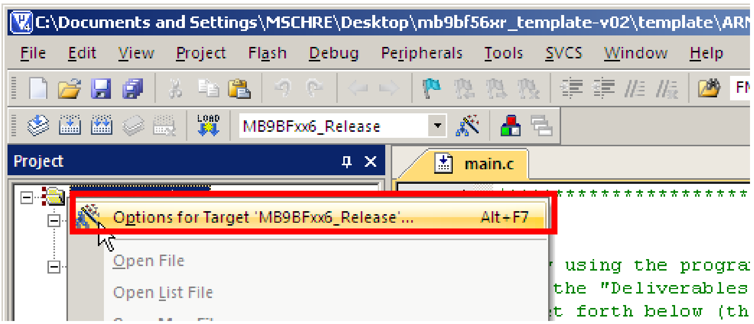
  - (4) Select in „CMSIS-DAP“
  - (5) Select tab „JTAG/SWD“
  - (6) Select SWD

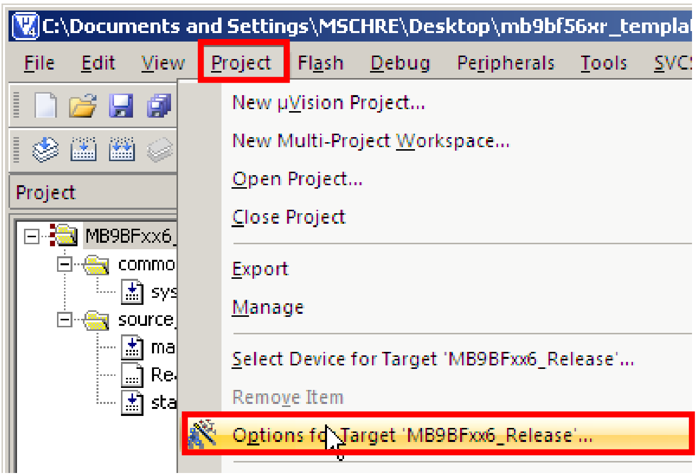


JTAG adapter CMSIS-DAP – within Keil µVision

Setup in Keil µVision (1)

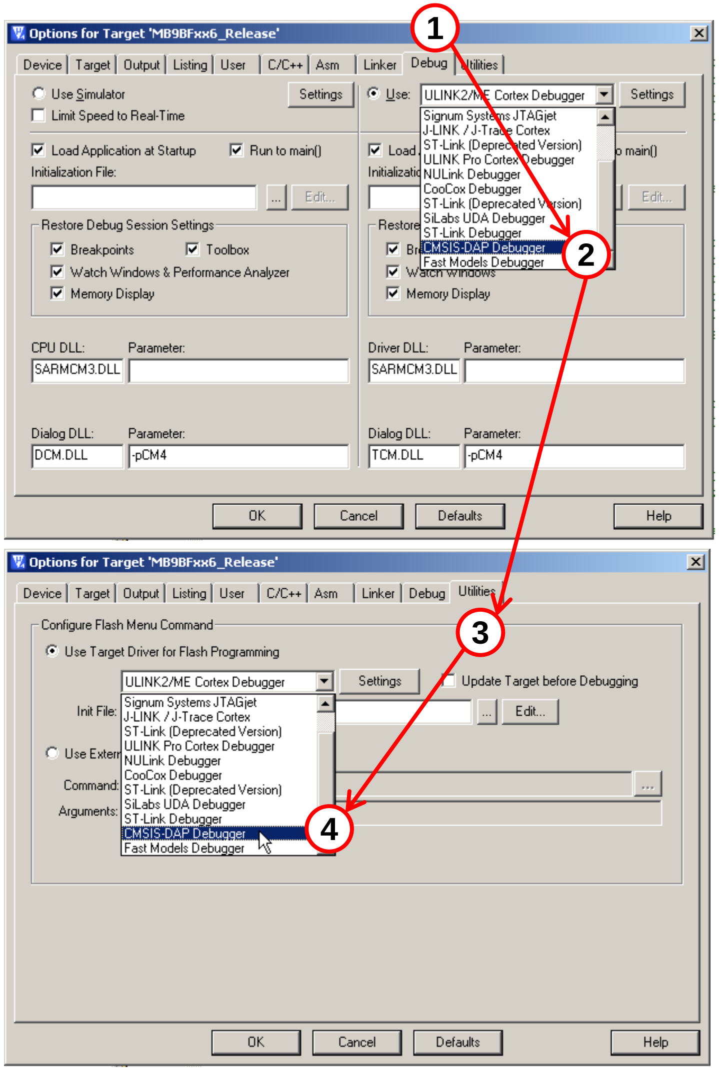
- Navigate to project options:
  - Via Project
    - Right-click at the project
    - Select „Options...“
  - Or via menu „Project“
    - Select „Options...“





Setup in Keil µVision (2)

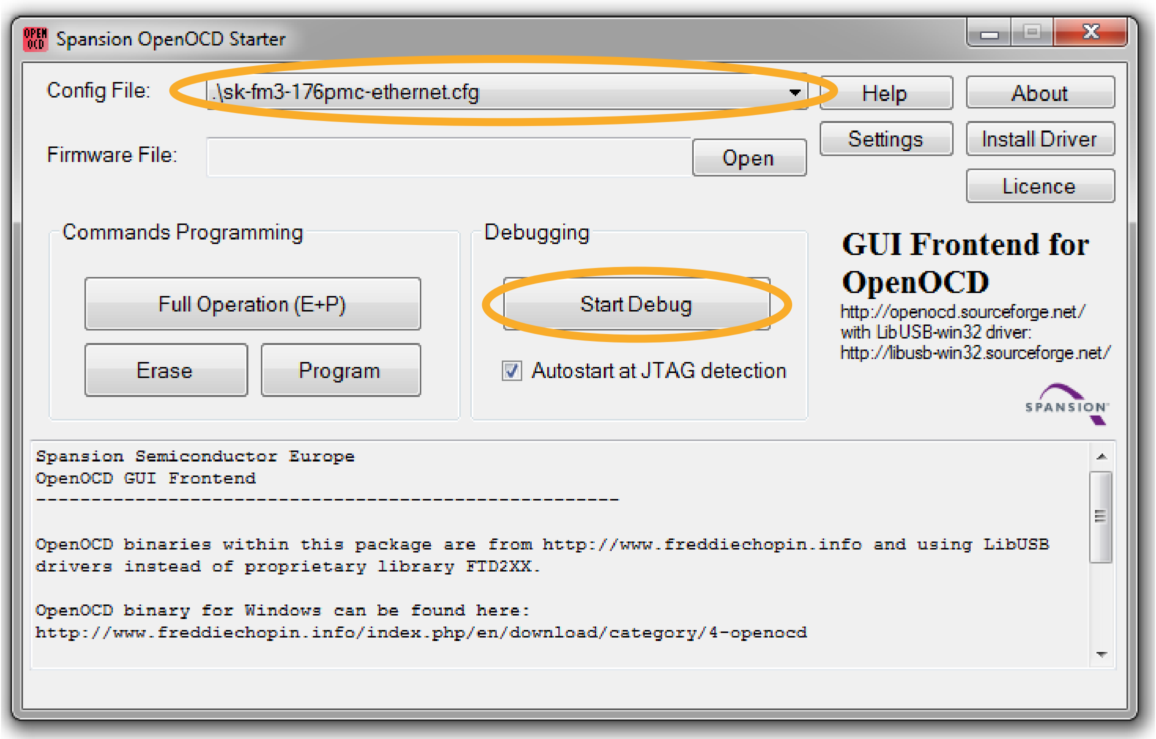
- Setup Debug & Utilities
  - (1) Select tab „Debug“
  - (2) Select „CMSIS-DAP Debugger“
  - (3) Select tab „Utilities“
  - (4) Select „CMSIS-DAP Debugger“



CMSIS-DAP Firmware update

Please see instructions contained in firmware update package!

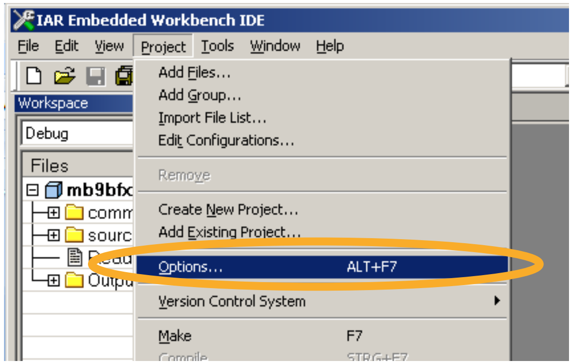
- SK-FM3-176PMC-ETHERNET v1.1 offers on-board debugging via OpenOCD instead of CMSIS-DAP via X11
  - Connect the board on X11 to the USB-Port of your PC
  - Open OpenOCD
  - Select the sk-fm3-176pmc-ethernet in config file



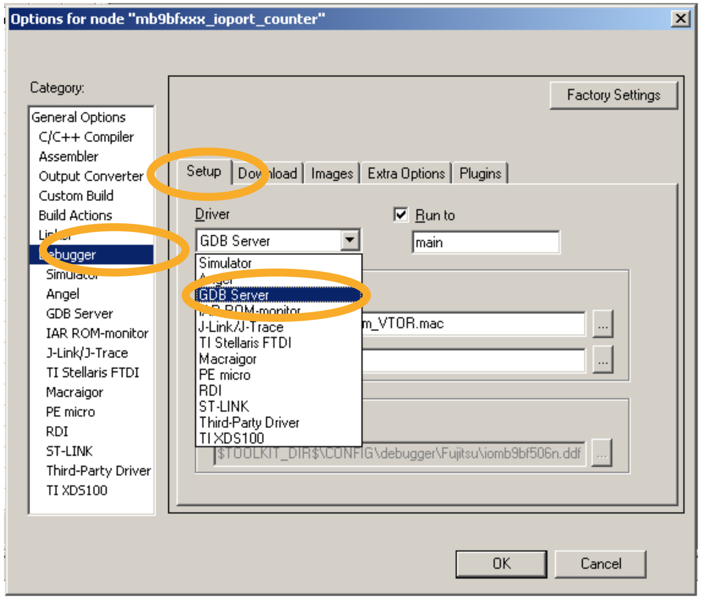
If necessary you can install or reinstall the drivers via the "Install driver" button

Debugging with OpenOCD (Board revision 1.1 only)

- IAR Workbench configuration
  - Open the project you want to debug.
  - Go to Project->Options

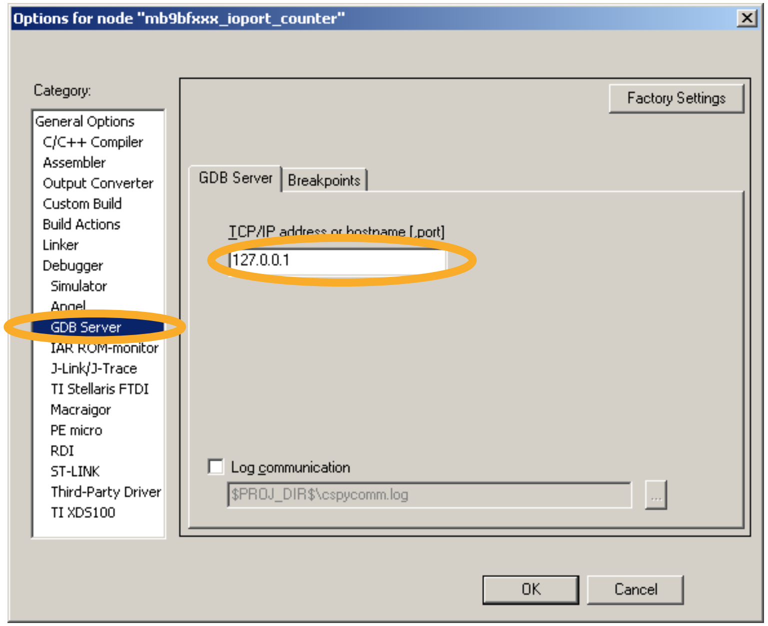


  - Select Debugger
  - Select Setup
  - As driver select GDB Server

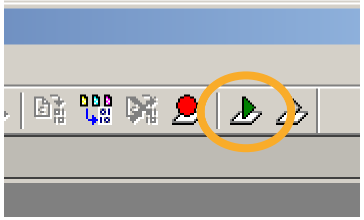


Debugging with OpenOCD (Board revision 1.1 only)

- IAR Workbench configuration
  - Select GDB Server
  - Type 127.0.0.1 on the field of TCP/IP address

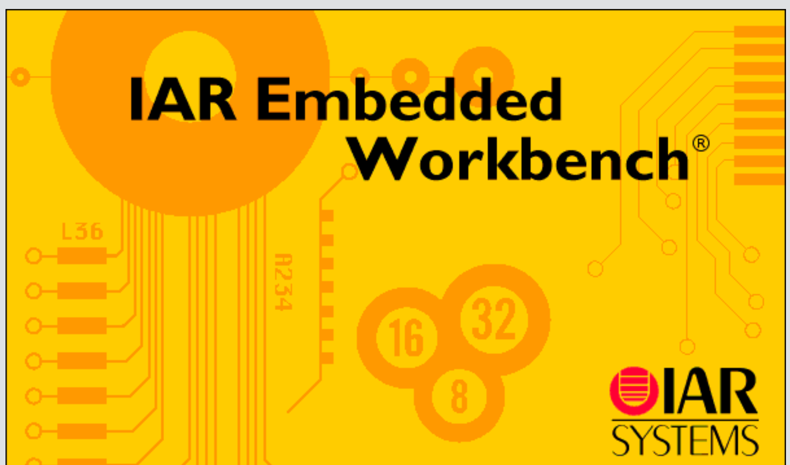


  - Start debug in IAR Workbench



IAR Embedded Workbench

- Installation
- Getting Started
- Open Project
- Build Project
- Debug Project



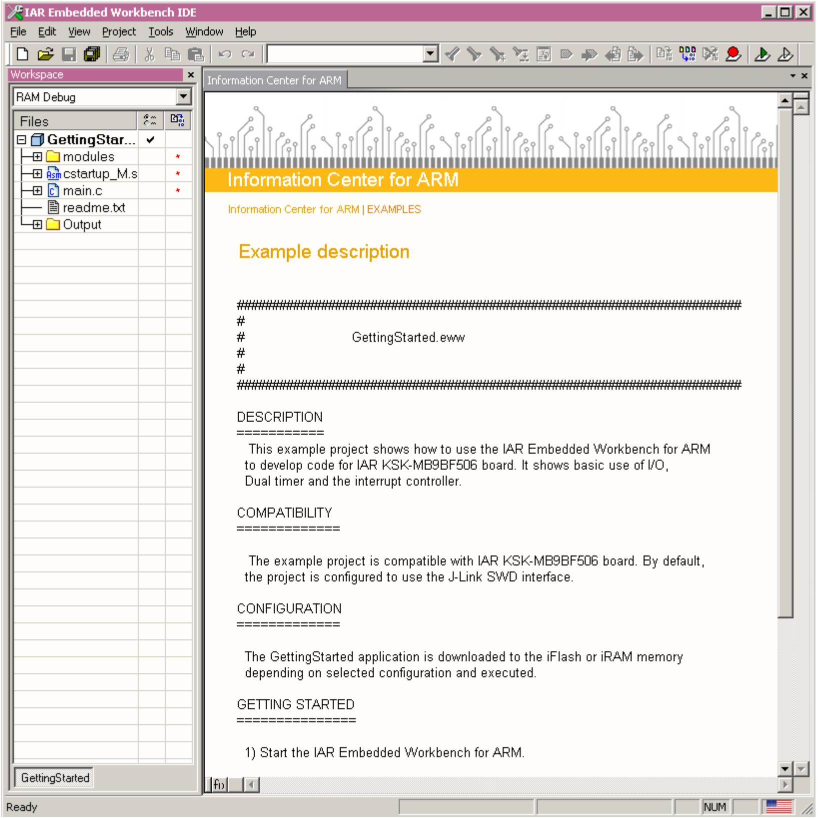
IAR Workbench Getting Started

- Install EWARM from IAR-CD or download latest version from IAR Website
  - EWARM size-limited (32k) or time-limited (full) Evaluation Version
    - http://supp.iar.com/Download/SW/?item=EWARM-EVAL
- Start EWARM Workbench
- Choose File → Open → Workspace
  - e.g.: <drive:>\sw-examples\

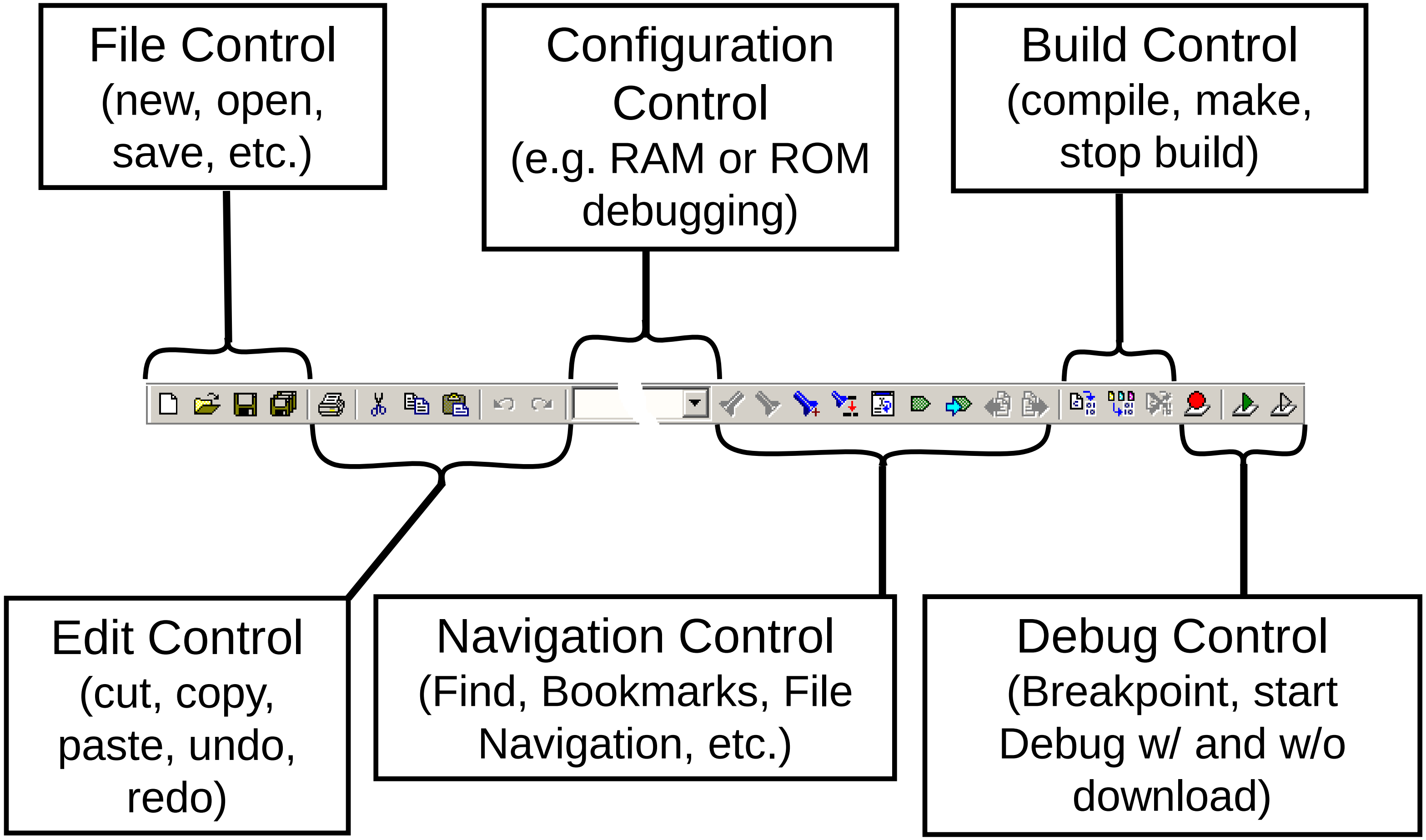


IAR Workbench – Main Window

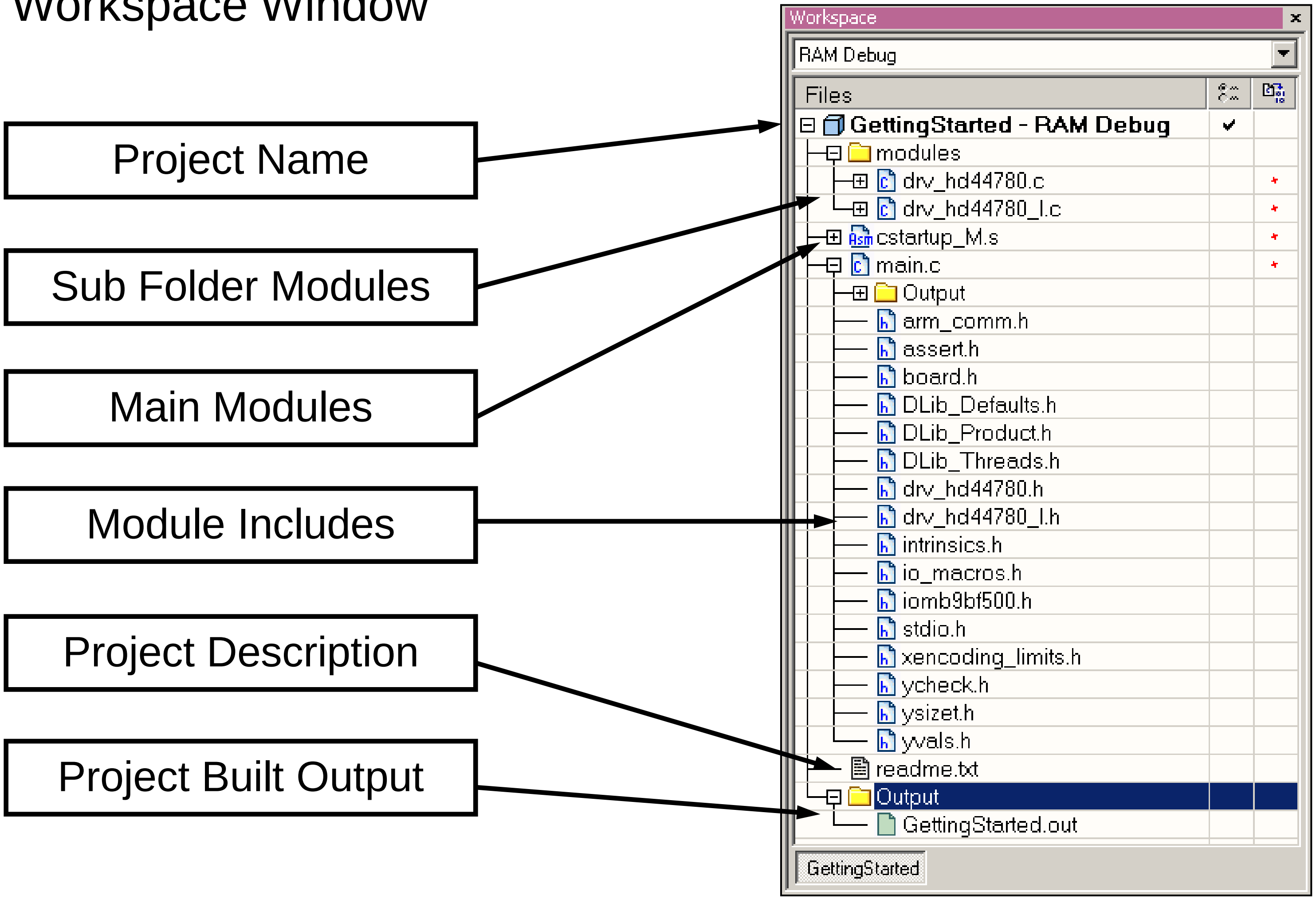
- IAR Workbench
  - Workspace on left side of Workbench window
    - If hidden then View→Workspace
  - Source files on right side of Workbench window as tabbed windows
  - Project open
    File → Open → Workspace → *.eww
  - For new projects
    start with ‚mb9bfd1xt_template'



- IAR Menu Bar

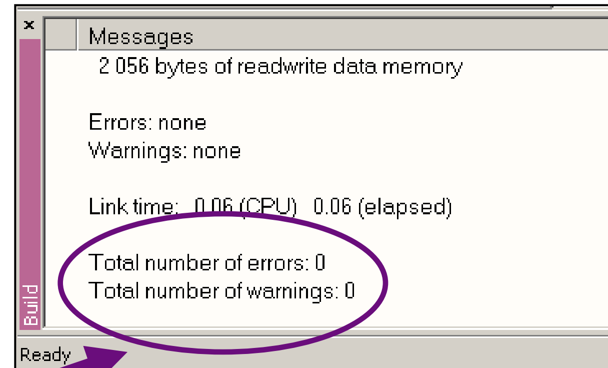

File Control
(new, open, save, etc.)
Configuration Control
(e.g. RAM or ROM debugging)
Build Control
(compile, make, stop build)
Edit Control
(cut, copy, paste, undo, redo)
Navigation Control
(Find, Bookmarks, File Navigation, etc.)
Debug Control
(Breakpoint, start Debug w/ and w/o download)

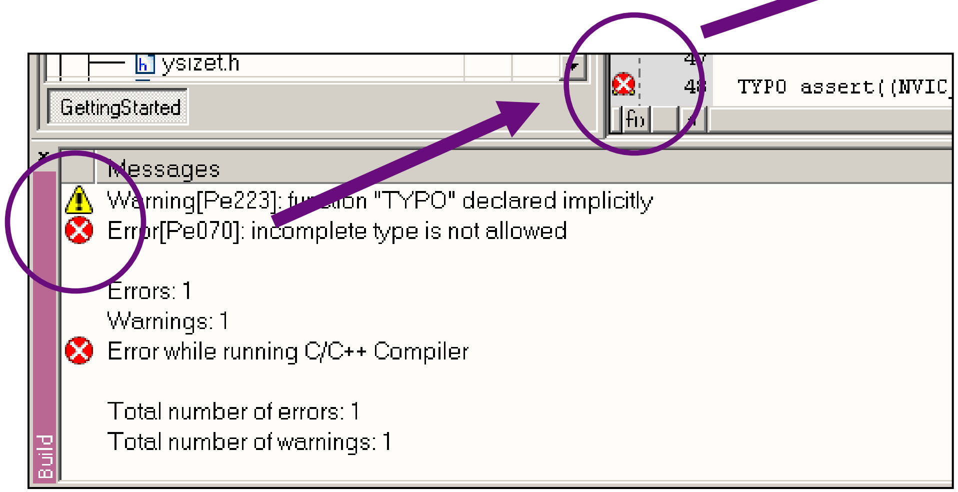
- IAR Workspace Window



  CONFIDENTIAL

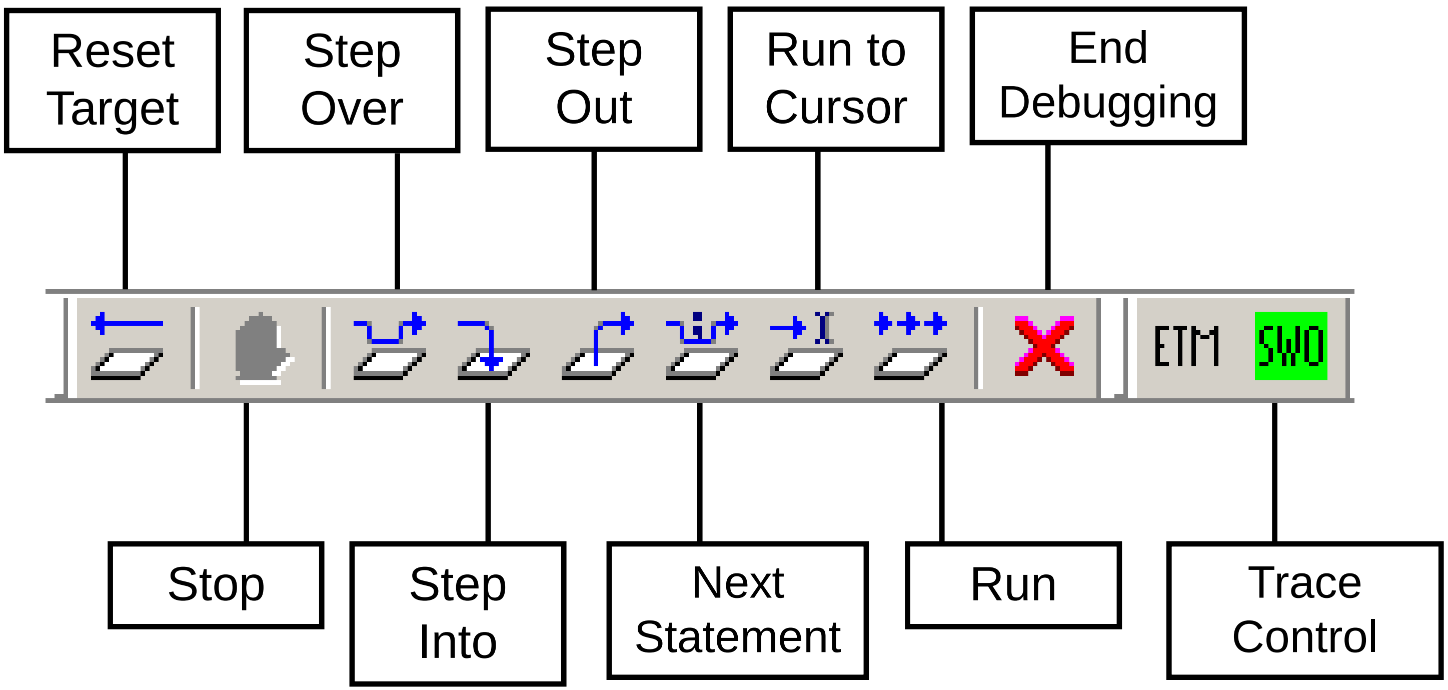
- Making the Project
  - Use Make-Icon ( ), <F7> or Menu: Project→Make
  - Check for no errors in Output window below
  - Build errors are indicated by or In Output window and Source view



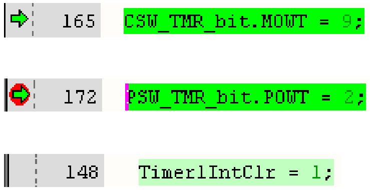


IAR Workbench – Download to Target

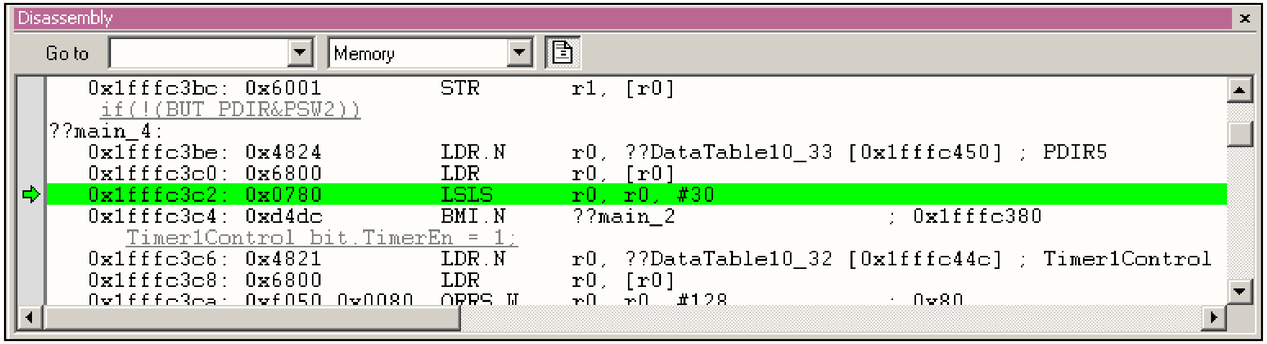
- Download to Target and Start Debugging
  - Use  Icon, <Ctrl>-D, or Project→Download and Debug
  - A new menu bar will occur on sucessful connection to target



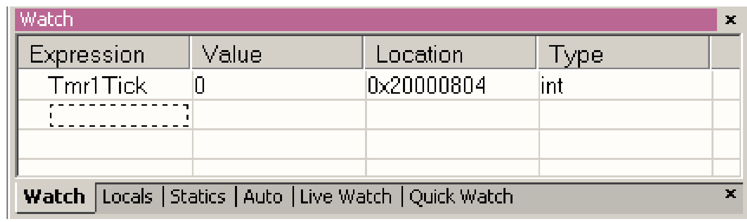
- Source Window
  - The Source windows do not change contents but get additional information
    - Current line (PC):
    - Halted on Breakpoint:
    - Halted on Data break (example):



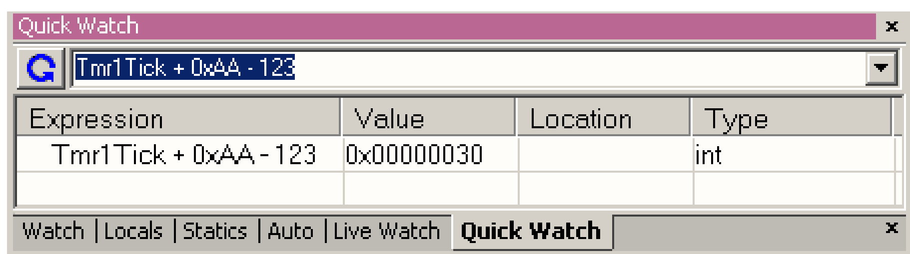
- Disassembly Window
  - Shows 'pure' disassebly view
  - Shows mixed mode view



- Watch Window
  - Watch
    - Expressions/Variables have to be added by user and are updated by Halt/Breakpoint



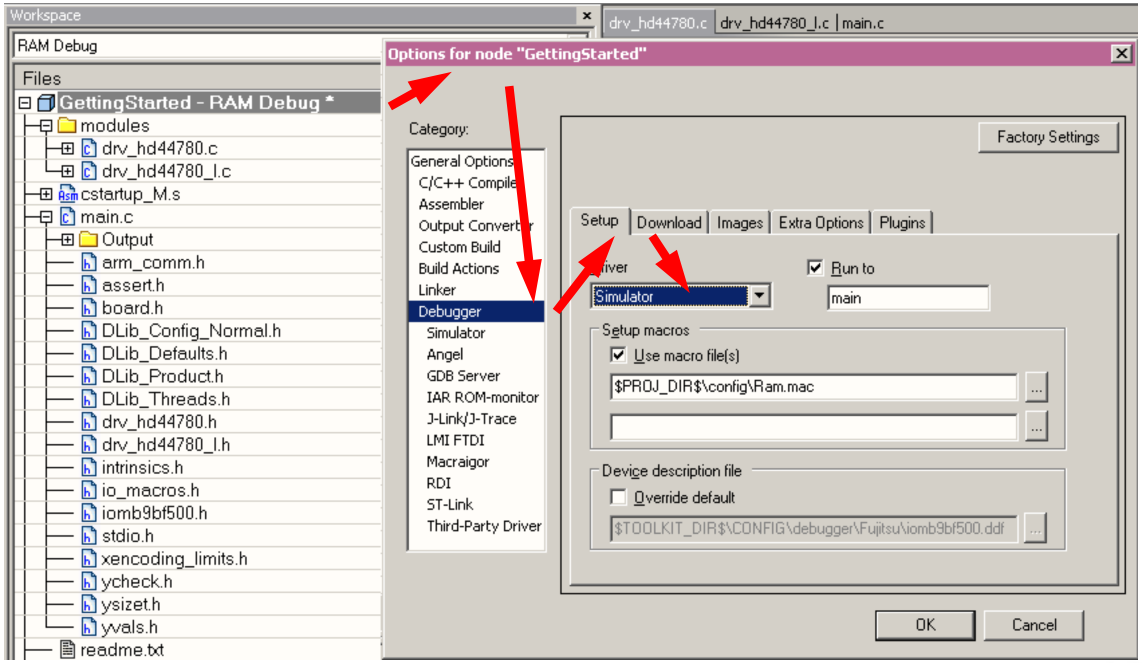
  - Quick Watch
    - The Quick watch allows the user to calculate and recalculate expressions even with variables



    - The drop down menu memorizes the last typed contents

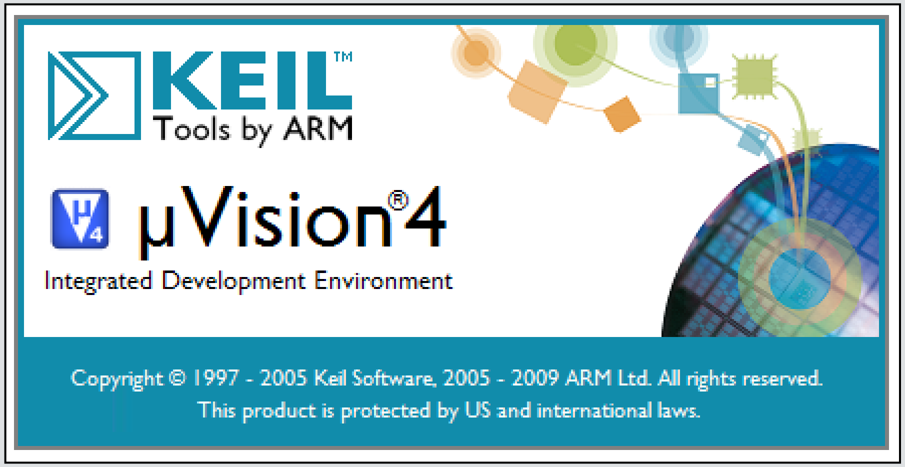
IAR Workbench – Simulator

- Simulator
  - Mark Project File in Workspace
  - Choose Project→Options
  - Choose Simulator in Debugger Setup
  - Start Simulator with usual  Icon



KEIL µVision

- Installation
- Getting Started
- Open Project
- Build Project
- Debug Project

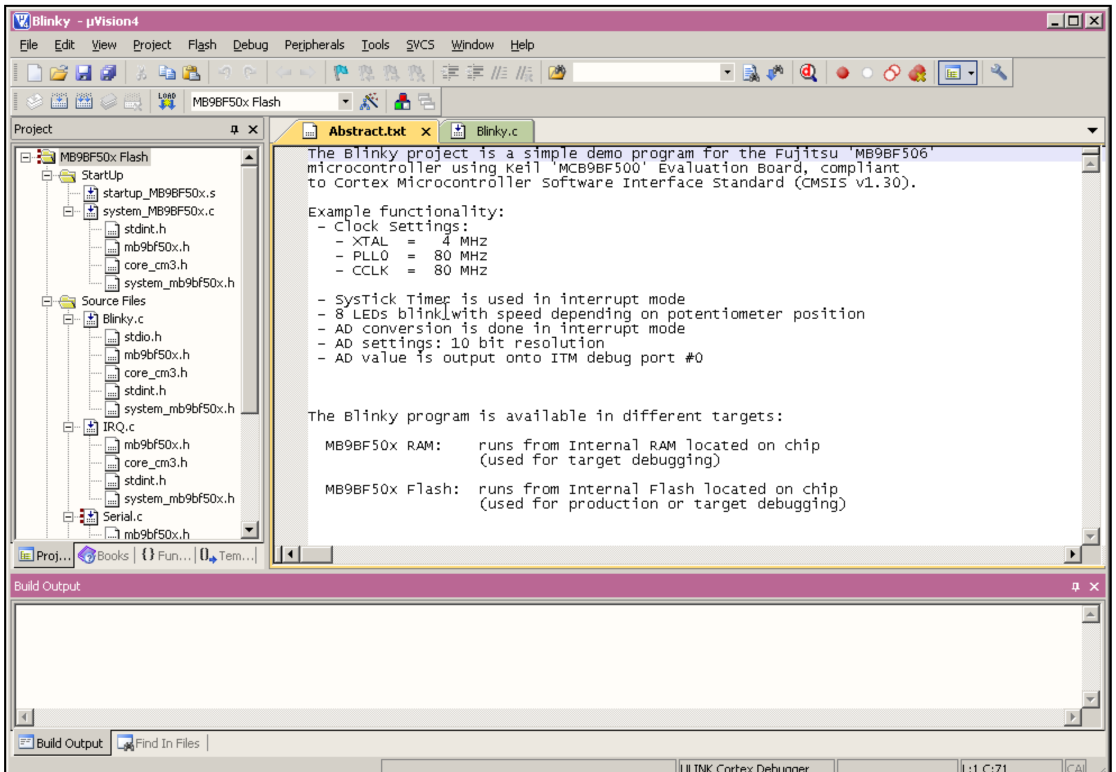


KEIL µVision IDE and Debugger Getting Started

- Install µVision from KEIL-CD or download latest version from KEIL Website
  - Evaluation Version
    - https://www.keil.com/demo/eval/arm.htm
    - Registration required
- Install ULINK-ME
  - Special installation is not needed, because ULINK-ME acts as a USB Human Interface Device (HID) and thus needs no extra USB driver
- Install ULINK Pro (optional)
  - ULINK Pro needs an own dedicated USB driver located in: <Installation Path>\KEIL\ARM\ULINK
- Start µVision

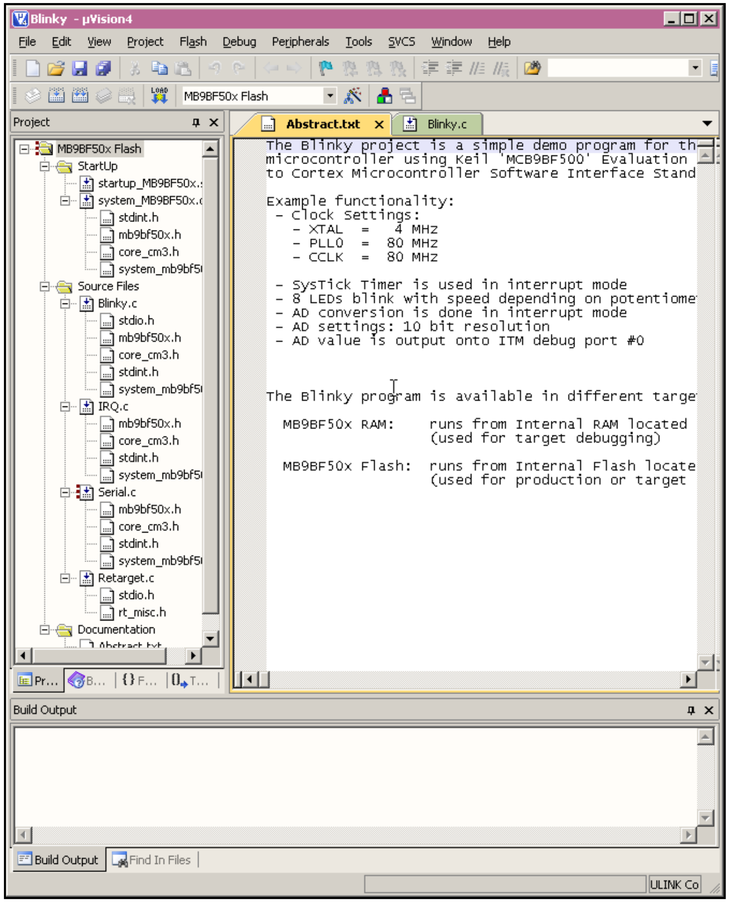
KEIL µVision – Getting Started

- Choose Menu: Project→Open Project...
  - Browse to: <drive:>\sw-examples\mb9bf56xr_gpio-v10\example\ARM\
  - Choose mb9bf56xr_gpio.uvproj

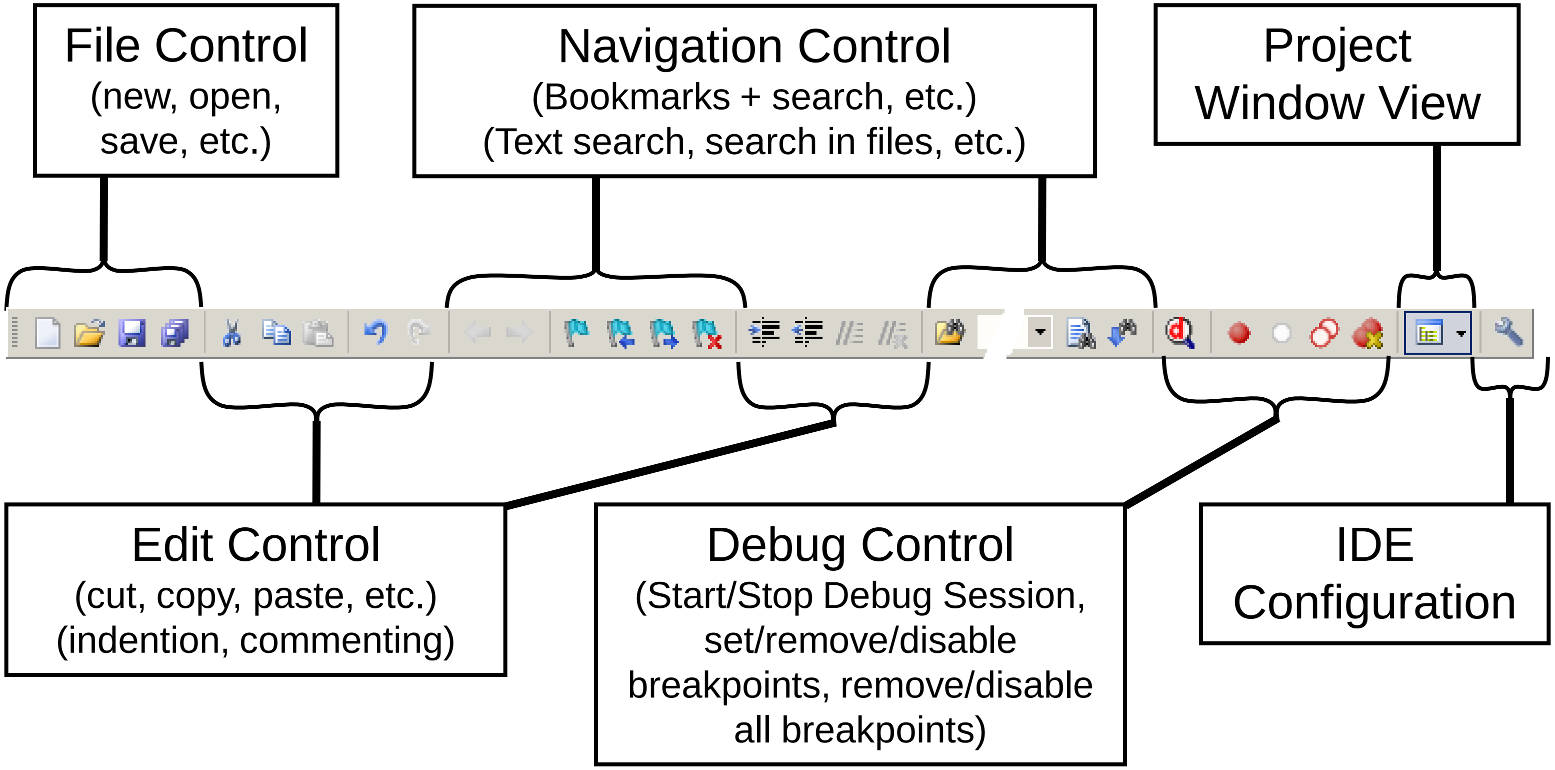


KEIL µVision – Main Window

- KEIL µVision
  - Project window on left side of IDE window
    - Choose: View→Project Window if hidden
  - Source files on right side of IDE window as tabbed windows
  - Output window on bottom side of IDE window

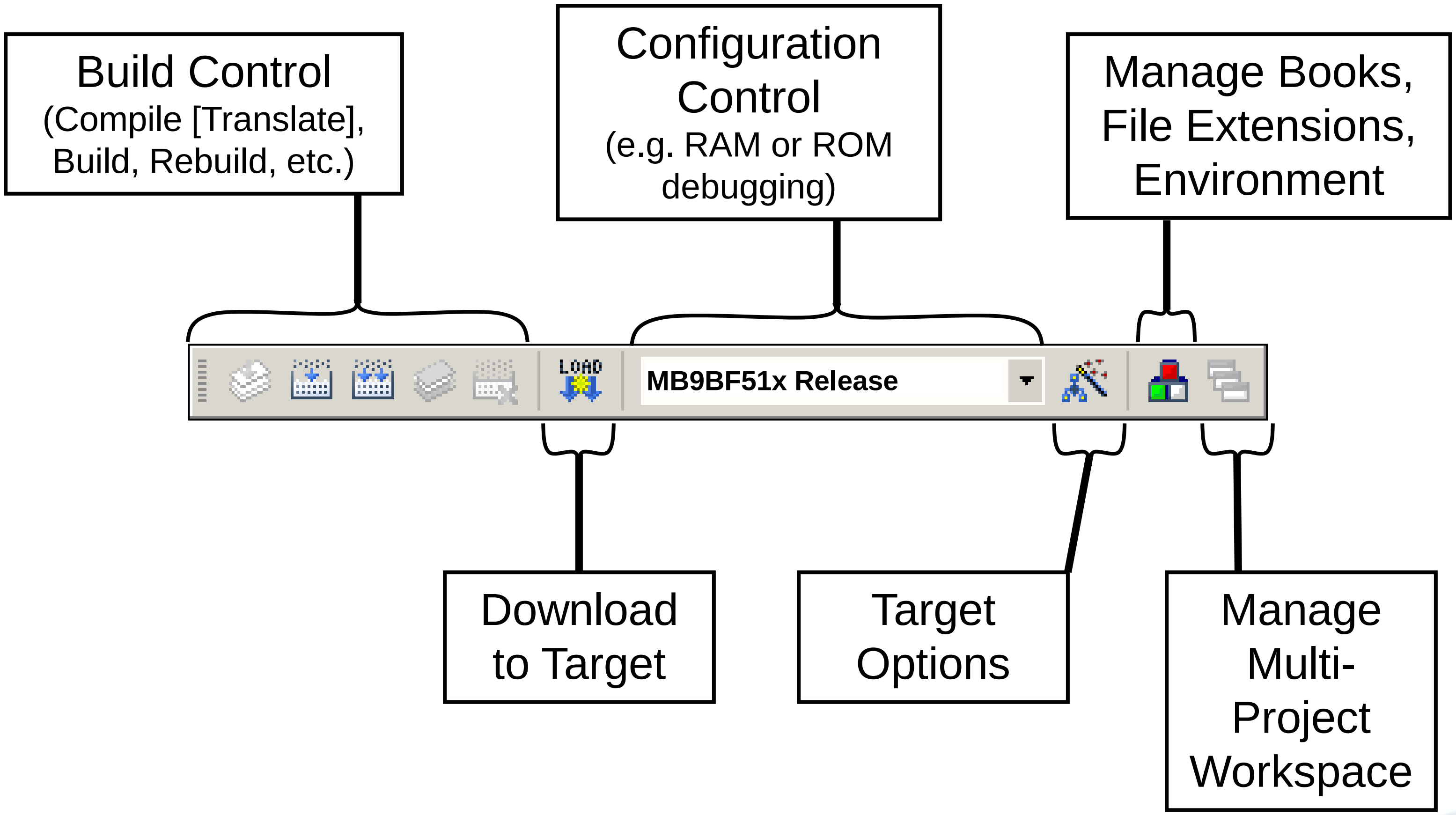


- Menu Bar 1
  - Can be moved in bar window area or set floating



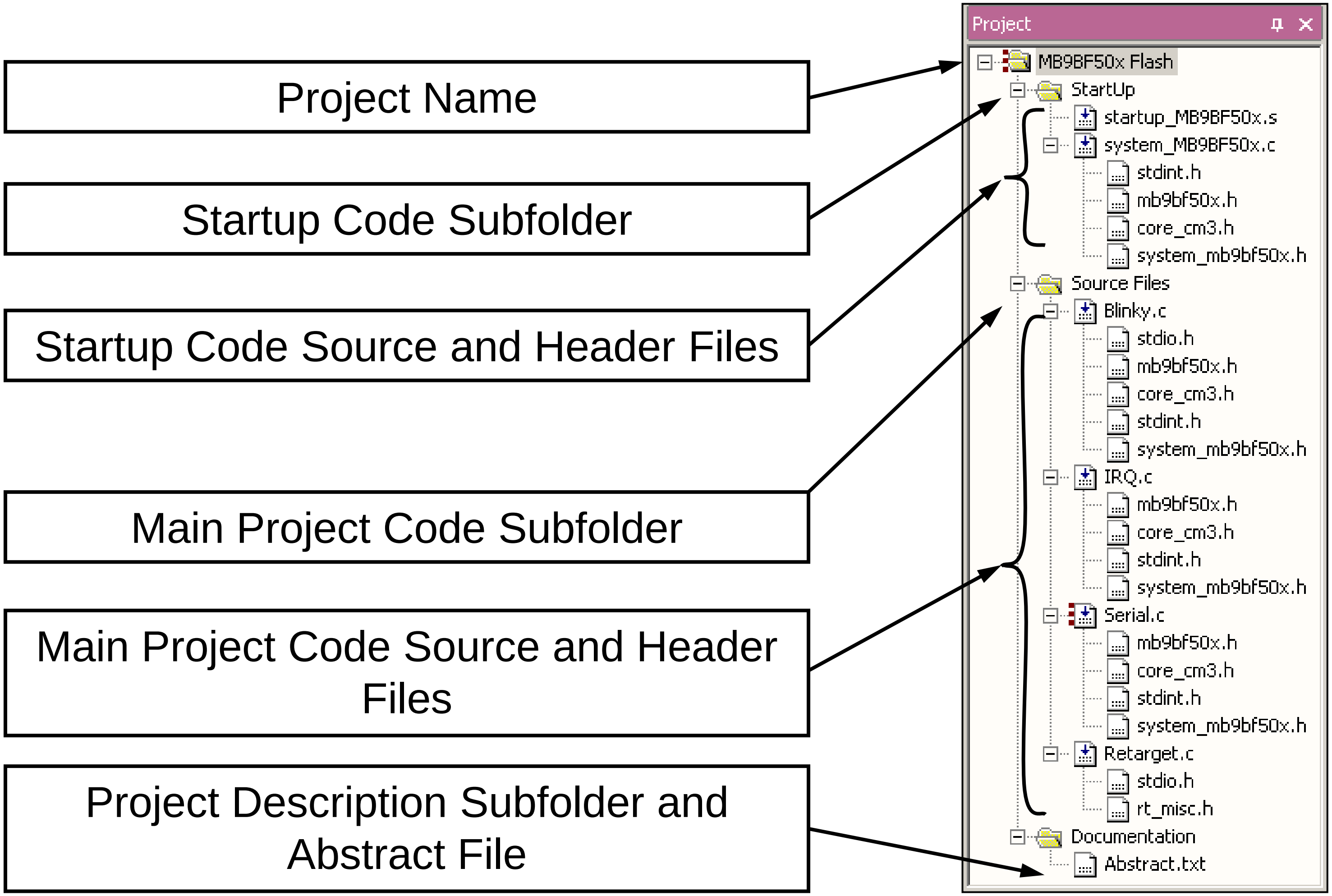
KEIL µVision – Menu Bars (2)

- Menu Bar 2
  - Can be moved in bar window area or set floating

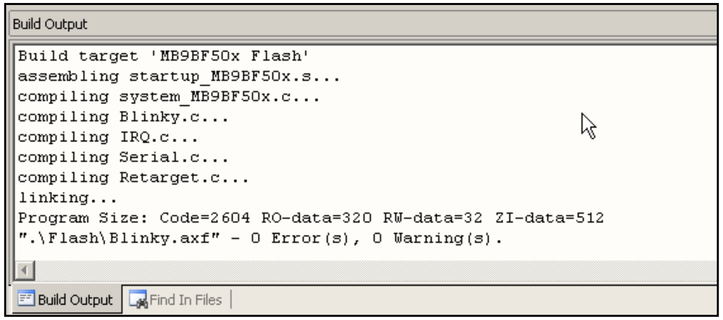


KEIL µVision – Project Window

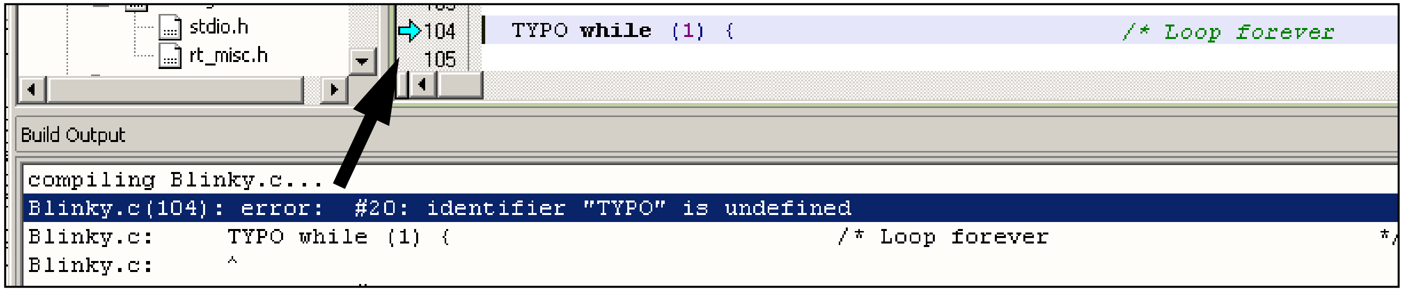
- µVision Project Window



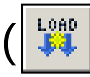
- Making the Project
  - Use Rebuild Icon ( ) or Project→Rebuild all target files
  - Check for no errors in Output window below

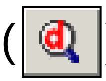


  - Build errors are shown in Output window.
    - Can be double-clicked by showing the source line with a blue arrow

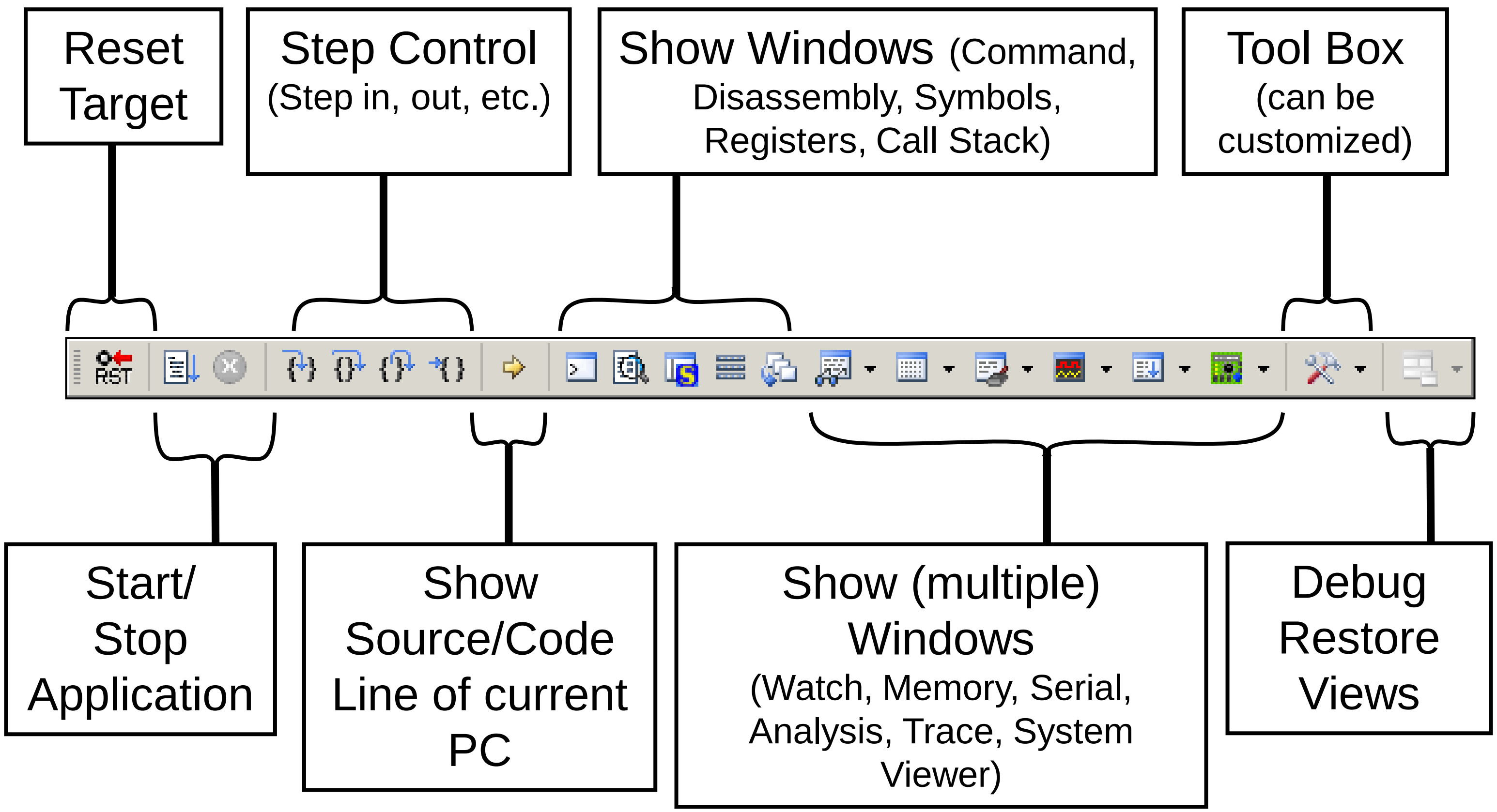


KEIL µVision – Debug (1)

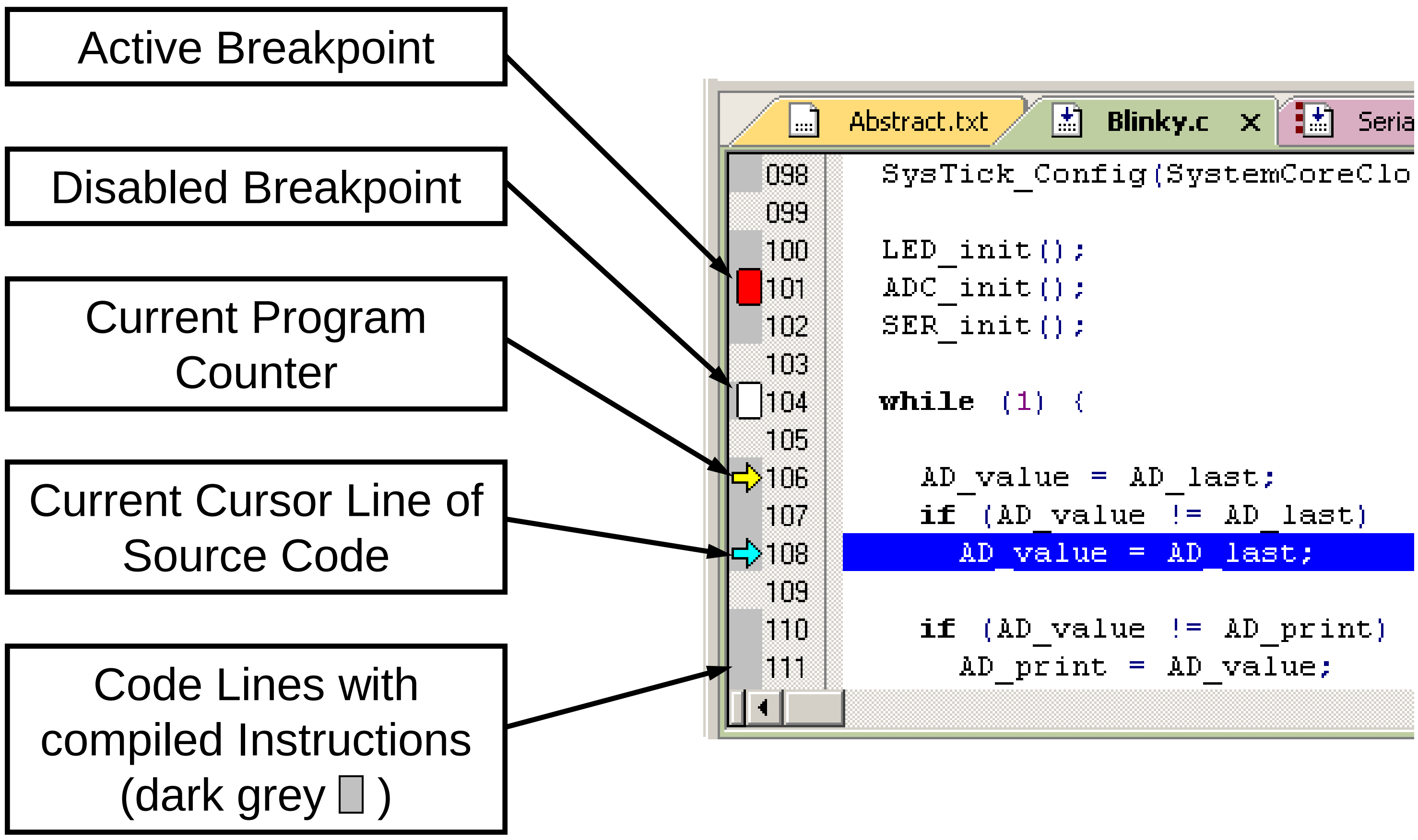
- Start Debugging
  - Download to target first, when MCU Flash does not contain the current application openend and built in the IDE
    - Use Download Icon (

) or Menu: Flash→Download
  - Start Debug Session
    - Use Start/Stop Debug Icon () or Menu: Debug→Start/Stop Debug Session
  - Ending Debug Session
    - Use same way as for starting debug session

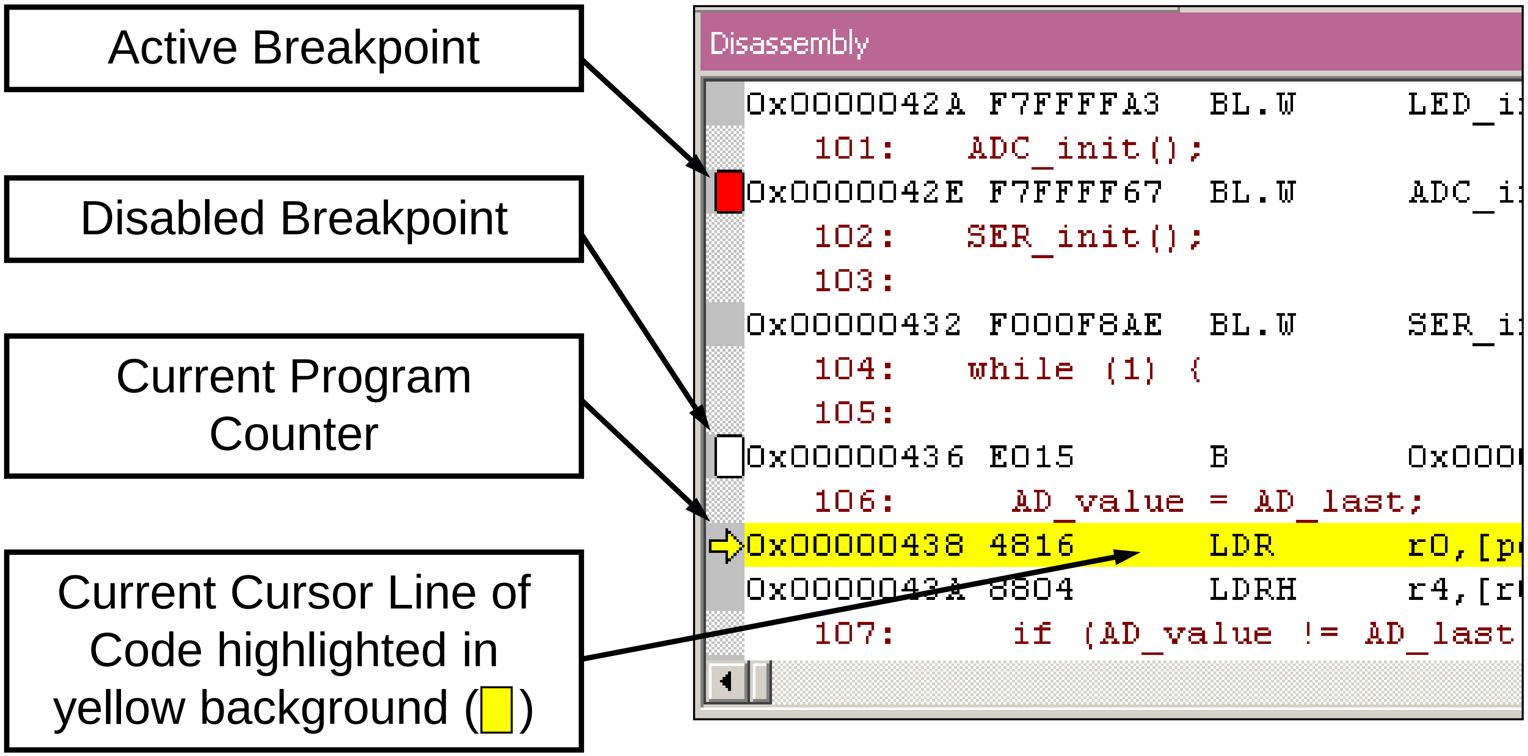
- Debugging Icon Bar
  - During a Debug Session there will be visible a new icon bar



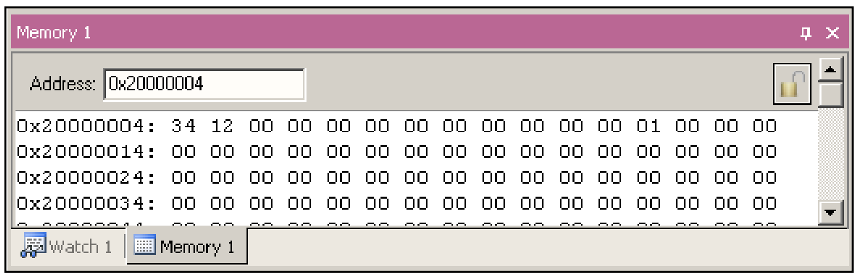
- Source View
  - The Source windows do not change contents but get additional information



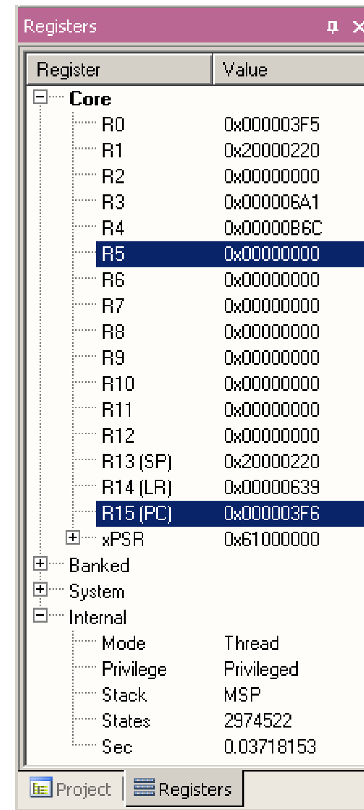
- Disassembly View
  - Mixed mode is selectable and deselectable



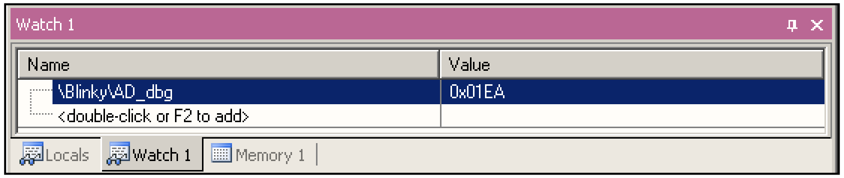
- Memory Window
  - Up to 4 Memory windows can be displayed in tabs
  - Memory is updated during runtime
  - Memory window tabs are shared with Watch windows



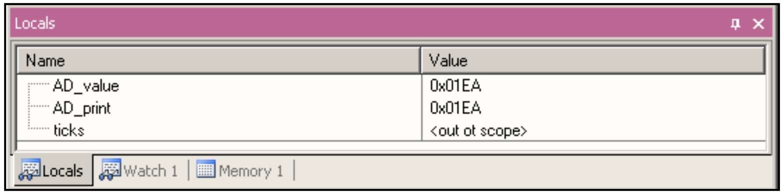
- Register View
  - Register view is a tab of the Project window
  - Changes are highlighted in dark blue text background
  - Register tree knots can be expanded



- Variable Windows
  - Watch Windows

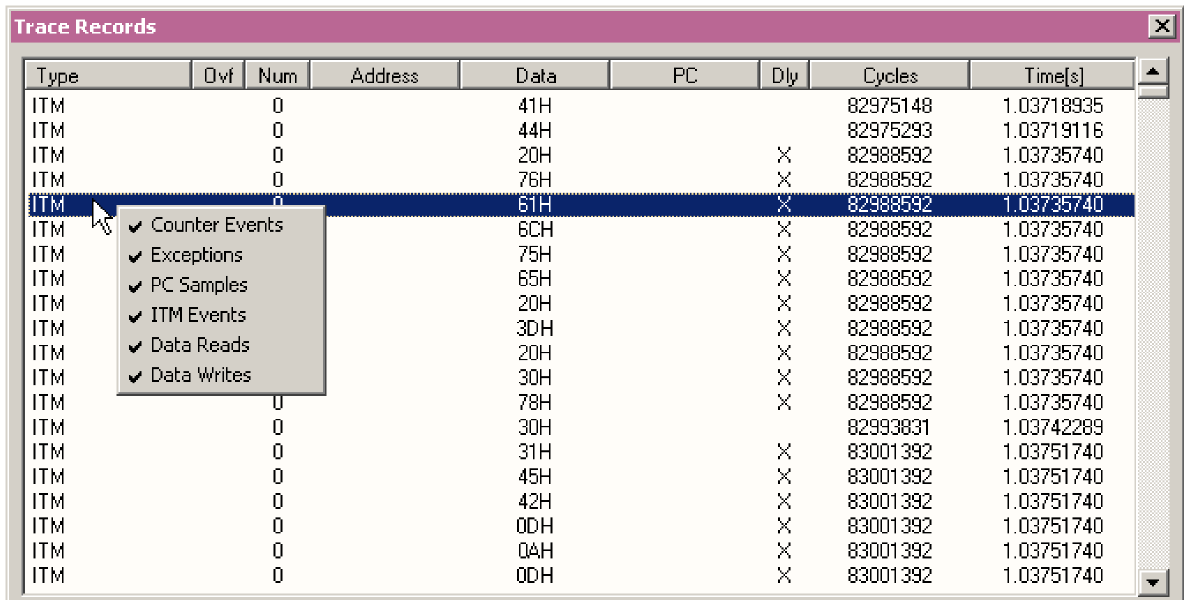


    - Up to 2 Watch windows are sharing their tabs with e.g. Memory and Local views
    - Updated during runtime
    - Any changes are highlighted in dark blue text backround color
    - Displayed values can be changed by user during break



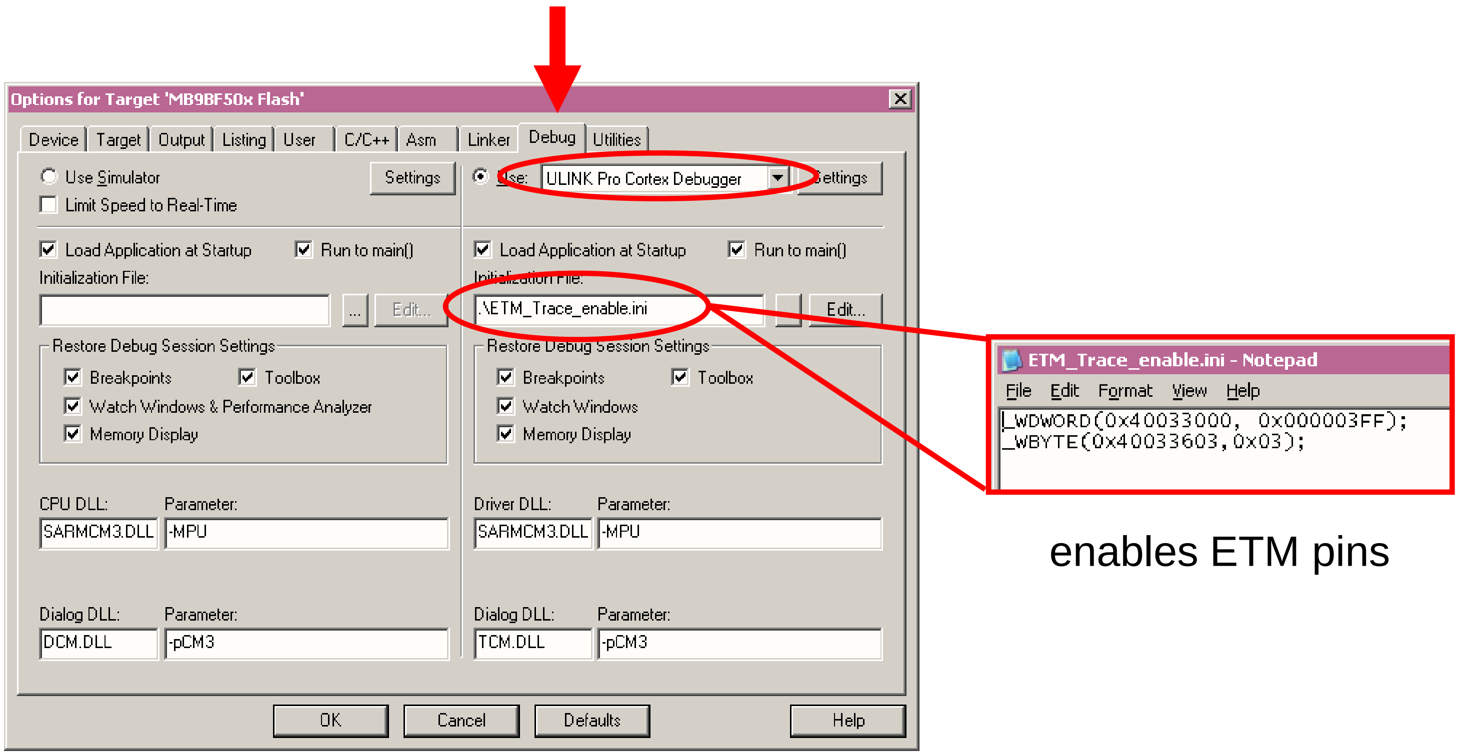
  - Local View
    - The local view shares the tab with e.g. Memory and Watch windows
    - Any changes are highlighted in dark blue text backround color
    - Displayed values can be changed by user during break

- Trace via ITM
  - Simple Trace views via Instrumentation Trace Macro is supported by µLINK ME
    - Records
    - Exceptions
    - Counters



Type	Ovf	Num	Address	Data	PC	Dly	Cycles	Time[s]
ITM		0		41H			82975148	1.03718935
ITM		0		44H			82975293	1.03719116
ITM		0		20H		X	82988592	1.03735740
ITM		0		76H		X	82988592	1.03735740
ITM		0		61H		X	82988592	1.03735740
ITM				6CH		X	82988592	1.03735740
ITM				75H		X	82988592	1.03735740
ITM				65H		X	82988592	1.03735740
ITM				20H		X	82988592	1.03735740
ITM				3DH		X	82988592	1.03735740
ITM				20H		X	82988592	1.03735740
ITM				30H		X	82988592	1.03735740
ITM		0		78H		X	82988592	1.03735740
ITM		0		30H			82993831	1.03742289
ITM		0		31H		X	83001392	1.03751740
ITM		0		45H		X	83001392	1.03751740
ITM		0		42H		X	83001392	1.03751740
ITM		0		0DH		X	83001392	1.03751740
ITM		0		0AH		X	83001392	1.03751740
ITM		0		0DH		X	83001392	1.03751740

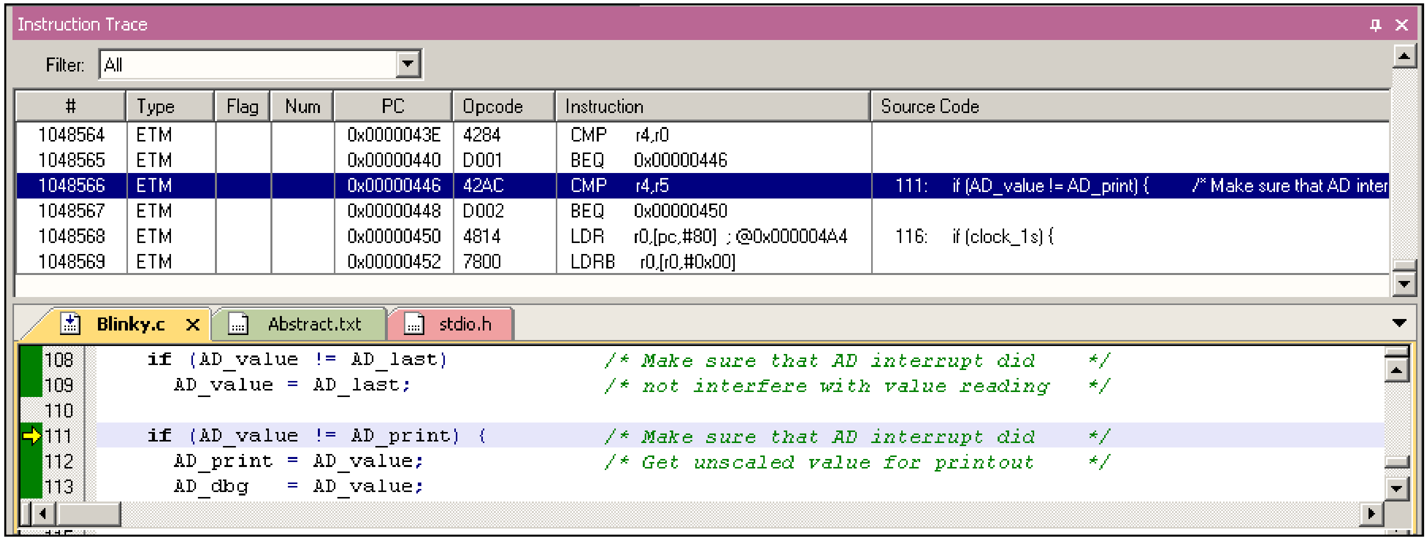
- Trace via ETM
  - Check settings in menu:
    Flash→Configure Flash Tools... Tab:Debug



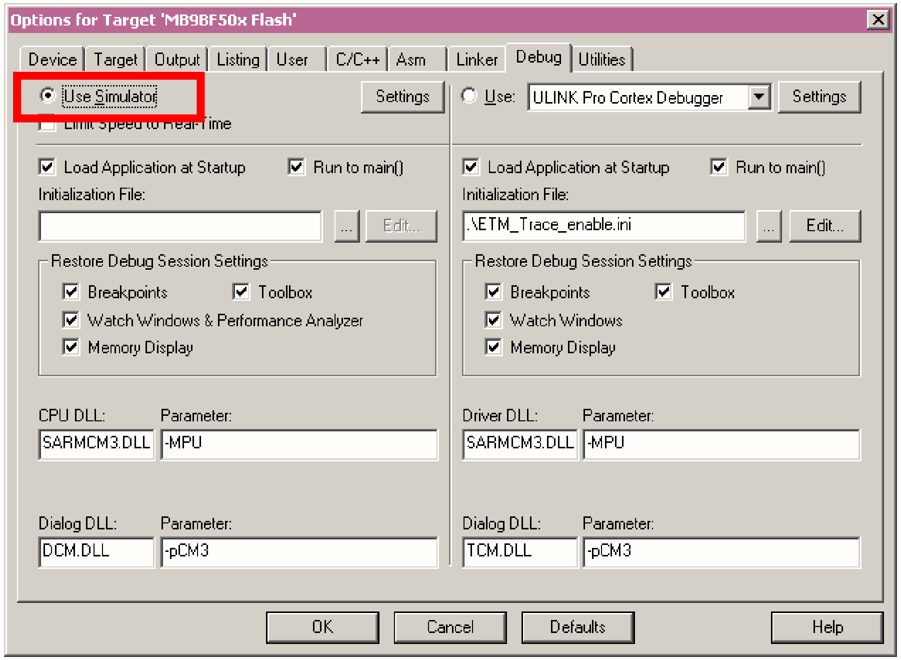
enables ETM pins

KEIL µVision – Trace (ULINK Pro) (2)

- Instruction Trace
  - Real Time Trace recording
  - Output can be filtered by several ETM and ITM events
  - Trace buffer is held in PC memory and transfered to µVision on break



- Simulator
  - The Core Simulator can be selected by the menu:
    Flash → Configure Flash Tools... and then choosing Use Simulator
  - Look & feel is like using ULINK debugger
  - Controlable also with *.ini files



Finally

Workshops & Seminars

Please register here: http://news.spansion.com/seminars

FM3/FM4 Seminar

- Overview FM3/FM4 family
  - Memory
  - Peripheral resources
  - Packages
- Processor architecture
  - Bus structure
  - Flash memory
  - Flash programming
- Peripheral resources
  - Clock distribution
  - Timer
  - Interfaces
  - FM3 features
- Development tool chains
  - IAR workbench / J-Link
  - KEIL µVision / uLink
  - Starter Kits
- Practical exercises
  - Flash programming
  - Project setup/modification
  - Debugging
  - External interrupts

Motor Control

- Introduction of Spansion MCU
  - Line-Up of microcontrollers with motion control features
  - Performance
- Introduction of motors types
  - ACIM
  - BLDC
  - PMSM
- Introduction of control types
  - Sinusoidal commutation
  - Field Orientated Control
  - Space Vector Modulation
- Peripherals of FM3/FM4 MCUs
  - Base Timer
  - Multifunction Timer
  - 12-bit A/D Converter
  - Quadrature Position and Revolution Counter
  - Interrupt Controller
- Hands-on exercise / SW-Example
  - BLDC motor with hall sensor
  - PMSM motor with field orientated control

USB Workshop

- Introduction of Spansion MCU
  - Line-op of USB MCUs
- USB vs. RS232
  - Historical Background
- Electrical Layer
- USB Protocol
  - Enumeration Process (Descriptors & USB Settings)
  - Transfer Types
  - Data Transfers
  - USB Class Concept
- Software Driver Concepts
  - USB Host
- USB Examples
  - Virtual COM Port
  - USB Descriptor Manager
    - Create Template Classes
    - Create Descriptors
- PC software based on LibUSB
- Special Use Cases
  - e.g. boot loader

Ethernet Workshop

- Introduction of Spansion MCU
  - Line-op of Ethernt MCUs
- Fundamentals of Ethernet
- Ethernet Microcontrollers
- Hardware Design considerations
- Software Design considerations
- Communication layer models
- The Internet Protocol suite
- Web technologies in embedded systems
- Developing Ethernet applications
  - Tools and methods
- Practical hints and advice on FM3 Ethernet solutions
- Hands-on training

Spansion Support

- Please check the following website, for any available updates

www.spansion.com

- Please contact your local support team for any technical question

America: Spansion.Solutions@Spansion.com

China: mcu-ticket-cn@spansion.com

Europe: mcu-ticket-de@spansion.com

Japan: mcu-ticket-jp@spansion.com

Other: http://www.spansion.com/Support/SES/Pages/Ask-Spansion.aspx

EU-Konformitätserklärung / EU declaration of conformity

Hiermit erklären wir, Spansion International Inc., Germany Branch, Pittlerstrasse 47, 63225 Langen, Germany, dass dieses Board aufgrund seiner Konzipierung und Bauart sowie in den von uns in Verkehr gebrachten Ausführung(en) den grundlegenden Anforderungen der EU-Richtlinie 2004/108/EC „Elektromagnetische Verträglichkeit“ entspricht.
Durch eine Veränderung des Boards (Hard- und/ oder Software) verliert diese Erklärung ihre Gültigkeit!

We, Spansion International Inc., Germany Branch, Pittlerstrasse 47, 63225 Langen, Germany
hereby declare that the design, construction and description circulated by us of this board complies with the appropriate basic safety and health requirements according to the EU Guideline 2004/108/EC entitled ’Electro-Magnetic Compatibility’.
Any changes to the equipment (hardware and/ or software) will render this declaration invalid!

Note:

This evaluation board is a Class A product according to EN61326-1.
It is intended to be used only in a laboratory environment and might cause radio interference when used in residential areas. In this case, the user must take appropriate measures to control and limit electromagnetic interference.
All data and power supply lines connected to this starter kit should be kept as short as possible, with a maximum allowable length of 3m. Shielded cables should be used for data lines. As a rule of thumb, the cable length used when connecting external circuitry to the MCU pin header connectors for example should be less than 20cm.
Longer cables may affect EMC performance and cause radio interference.

Recycling

- Gültig für EU-Länder:
  - Gemäß der Europäischen WEEE-Richtlinie und deren Umsetzung in landesspezifische Gesetze nehmen wir dieses Gerät wieder zurück.
  - Zur Entsorgung schicken Sie das Gerät bitte an die folgende Adresse:
- Valid for European Union Countries:
  - According to the European WEEE-Directive and its implementation into national laws we take this device back.
  - For disposal please send the device to the following address:

CCS Express GMBH
c/o Spansion International Inc.
Frankfurter Str. 83-107
D-65479 Raunheim
Germany

- This board is compliant with China RoHS

www.spansion.com